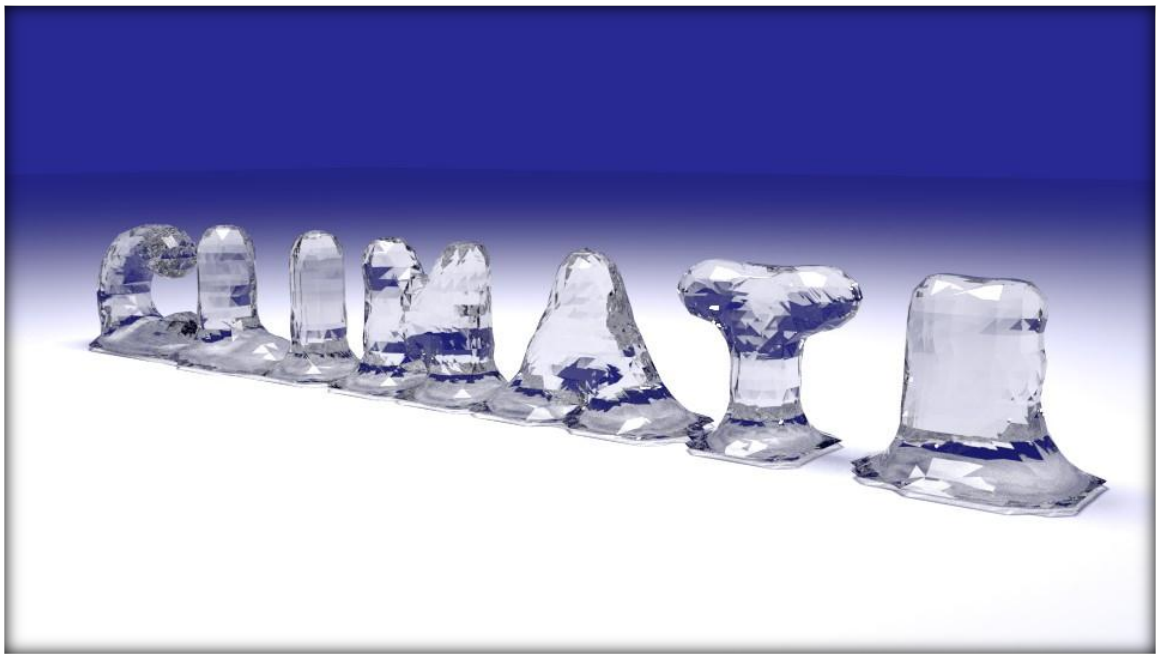
CLIMATE CHANGE ANNUAL REPORT, 2013



California Department of Water Resources

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I have always been struck by the thought that we are the authors of our own stories. I keep a sign above my desk that reads, "We can make them live." Many may have passed by and wondered at its meaning, and though it indeed is a reference to our ability to imbue words with life, my time in the Climate Change Program at the California Department of Water Resources (DWR) reminds me daily that our capacity for framing our story in this state extends beyond our daily work and words.

The climate change story in California is one of human capacity. The reality of the effects of human activity on our environment has become increasingly evident in a time of uncertainty for our natural resources. Sea level rise, extreme weather events including prolonged droughts and more devastating floods, and the degradation of resources due to pollution are among the many antagonists our story has wrought in recent years – but our story need not end there.

The projects and efforts listed on the following pages provide the framework for a new chapter in the story of human capacity for significant environmental change. Our dedicated staff is guided by a core belief that we can make a difference. Some changes begin with words. Some changes begin with actions. Regardless of where we start, we come to work knowing that we can make them live.

Michael Healey, Climate Change Program Assistant

September, 2014

FIELD STUDIES

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Evaluation of Benefits of Meadow Restoration on Sierra Nevada Water Supply

Sponsor/Program Manager	FESSRO/DSIWM/Climate Change Team
Project Manager	Harry Spanglet

Project Objective:

Investigate the role of restoring degraded montane meadows in water management in the Sierra Nevada

Project Description:

In a natural, un-degraded condition, mountain meadow communities have deep soils, dense herbaceous vegetation, and a naturally-developed drainage pattern where water flows across the flat meadow surface and infiltrates the soil; shallow meandering channels then carry water to downstream drainages. Meadows typically remain fully saturated for most of each year and can store substantial quantities of groundwater in their soils, acting as natural reservoirs of water at high elevations. Slow release of water stored in meadow sediments can provide base flow to downstream drainages long after surface runoff has stopped for the season; in addition, the water storage capacity of meadows can buffer the rate of water runoff during snowmelt and reduce peak flows that cause flooding downstream. The net result is a reduction in extremes of runoff, increasing the low flow and reducing peak flows.

Degraded meadows that have been exposed to poor land-use practices, such as overgrazing of livestock, off-highway vehicle traffic, and draining, typically exhibit “gully erosion,” in which shallow channels are deeply eroded and all water entering the meadow drains rapidly into stream channels rather than across meadow surfaces. The channelized flow does not allow the soils to become saturated, eliminating the beneficial hydrologic effects of meadow communities and leading to drastic changes in meadow vegetation. Meadow restoration is the practice of reversing the effects of gully erosion by filling gullies and re-establishing a quasi-natural hydrologic regime by redirecting surface flows across meadows, allowing water to infiltrate the sediment, raise groundwater levels, and potentially restore the beneficial hydrologic functions of meadows.

DWR has provided funding to the US Forest Service for a three-year investigation (partly extended to five years due to operational and management difficulties) of the hydrologic effects of meadow restoration and how restored meadows can contribute to improved system operation as well as ecosystem functioning. In 2010 the project began meeting the goals of the funding, including: delineating potential meadows using available Geographic Information System (GIS) datasets, delineating meadows in the field and comparing the field delineations to those derived from GIS analysis; assessing meadow condition in a random sample to extrapolate to the condition of all Sierra meadows; installing instrumentation to assess hydrology of undisturbed and restored meadows.

Funding Information:

Project Budget:	$313,000 (DWR match)	**Funding Source:**	Prop 84

Project Start Date:	6/1/2010	Project End Date:	DATE IN PROGRESS N/A Project extended to 3/2015

External Partners:

National Fish and Wildlife Federation, US Forest Service

Project Accomplishments for 2013:

- Further update of annotated bibliography of scientific literature pertaining to meadow restoration and hydrology, which indicates that meadow restoration has beneficial effects on streamflow
- An inventory of meadow communities on public lands in the Sierra Nevada. Efforts to identify and delineate meadow communities on all lands in the SN using GIS and remote sensing methods were unsatisfactory.
- Field assessment of meadow delineations and quantification of extent and degree of meadow erosion in a sample of meadows throughout the Sierra Nevada. Field-based estimates combined with previous inventories provide an estimate of 86,000 acres on public land and 191,000 acres on al lands in the Sierra Nevada. Results indicate that the majority (ca. 70%) of SN meadows are sufficiently eroded/incised to eliminate beneficial hydrologic functions. Potential improvements in groundwater storage capacity in the SN using this total meadow acreage are estimated at approx. 53,000 acre-feet per year.
- Water budget studies for representative meadows have been partially completed, and will continue in 2013. Initial results indicate that meadow erosion depletes both meadow alluvium and surrounding bedrock of groundwater.
- Completion and publication of a model of groundwater dynamics in incised meadows, indicating that meadow erosion decreases long-term groundwater storage.
- Long-term hydrologic effects of meadow erosion are still uncertain, but likely include diminished streamflow, lower regional water tables, reduced mountain block recharge, and reduced groundwater storage in headwater areas.

Project Deliverables/Timeline:

- Literature review of hydrologic effects of montane meadow restoration: completed
- Geographic inventory of meadow communities in the Sierra Nevada: completed
- Evaluation of extent and prevalence of meadow degradation through erosion: completed
- Determination of water budgets for sample of degraded and undegraded meadow communities: additional data will be collected during an extension of project funding period, and results will be available in winter 2014.
- Simulation modeling of meadow hydrology and synthesis of results: groundwater modeling completed, with results published in a peer-reviewed scientific journal. Evaluation of the hydrologic role of ponds in restored meadows completed winter 2013.

Customers:

USDA Forest Service

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Paleohydrology

Sponsor/Program Manager	John Andrew
Project Manager	Jeanine Jones

Project Objective:

Use paleoclimate information to better understand natural climate variability & develop analog years

Project Description:

The Department executed a contract with the University of Arizona for development of tree-ring reconstructions of paleostreamflows in the Sacramento, San Joaquin, and Klamath River Basins. Extending streamflow records beyond the relatively short period of the historical record provides an improved picture of climate variability and yields data for use in operations model sensitivity analyses and for vulnerability analyses. Very limited fieldwork under the contract began in fall 2010; the final report will be completed in 2014. Additionally, with funds provided by USBR, the University is developing a database of climate analog years for DWR including the paleo data.

Funding Information:

Project Budget:	$400,000 DWR/$200,000 USBR	**Funding Source:**	Prop 84

Project Start Date:	2010	**Project End Date:**	DATE / IN PROGRESS / N/A X

External Partners:

University of Arizona, US Bureau of Reclamation

Project Accomplishments for 2013:

Most of the field work involving coring living trees was completed this year, but collection of dead wood using a chainsaw could not be performed due to dry conditions and USFS prohibitions on chainsaw use. Chronologies have been prepared for the samples collected, and preliminary reconstructions have been developed with presently available samples. The approach to setting up the analog years database has also been worked out.

Project Deliverables/Timeline:

1. Reconstructed streamflows for Sacramento, San Joaquin, and Klamath Rivers
2. Database of analog climate years

   Final field collections will be completed in summer 2013, followed by preparation of final chronologies and reconstructions in the fall. The final report on the work under DWR's contract is due by March 1, 2014. The USBR-funded work on the analog years database should also be completed in 2014.

Customers:

DWR Drought program, Calsim modelers, DFM hydrology branch

PLANNING, MODELING, AND DATA COLLECTION

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Technical Advisory Group (CCTAG)

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

An external panel of expert advisors provides Department-wide guidance for Climate Change Scenario selection and methodology for the California Water Plan and various Department planning efforts and projects, future flood needs, and IRWM support.

Project Description:

The CCTAG advises DWR on the scientific aspects of climate change, its impacts on water resources, the use and creation of planning approaches and analytical tools, and the development of adaptation responses. A standing technical advisory group on climate change impacts and adaptation serving all DWR programs provides external guidance and support for a variety of climate-related issues, including scientific review of climate change models and scenarios, interpretation of scientific information produced by the National Climate Assessment and the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, and informing DWR's climate change adaptation policies. Benefits include consistency in the scientific advice the Department receives on climate change, and the administrative efficiency of not having redundant climate change advisory groups across the Department. The Department's Climate Change Program oversees and coordinates the CCTAG.

Funding Information:

Project Budget:	$300,000	**Funding Source:**	Prop 84

Project Start Date:	2011	**Project End Date:**	DATE IN PROGRESS N/A March, 2015

External Partners:

California Water Plan Statewide Water Analysis Network, State Climatologist Office

Project Accomplishments for 2013

CCTAG members were chosen from solicited statements of qualification by a technical review committee within DWR, and announced on February 13, 2012. A group of external experts will serve the Department for a three-year volunteer term, commencing in 2012. Specialties of panelists include: Atmospheric science; Hydrology; Civil Engineering/Infrastructure; Environmental science; Climate data and statistics; Social science; Resource Economics; Land use planning; and Climate modeling. CCTAG members are:

Holly Alpert, Inyo-Mono Integrated Regional Water Mgmt Program

Michael Anderson, State Climatologist (DWR)

Barney Austin, INTERA Incorporated

Dan Cayan, Scripps Institution of Oceanography

David C. Curtis, WEST Consultants, Inc.

Mike Dettinger, Scripps Institution of Oceanography

Guido Franco, California Energy Commission

Konstantine Georgakakos, Hydrologic Research Center/ Scripps Institution of Oceanography

John Gyakum, McGill University

Al Herson, Sohagi Law Group

Ruth Langridge, University of California, Santa Cruz

M. Lev Kavvas, UC Davis

Kelly Redmond, Western Regional Climate Center

Sarah Young, Santa Clara Water District

The CCTAG met in 2013 in person on April 25, August 23, and December 6, and on occasional conference calls. 2013 accomplishments included establishing a road map for global climate model selection for CA water resources, and initial planning for a list of recommendations to DWR on handling climate change, to be completed by the end of their volunteer term in March, 2015.

The materials for all CCTAG meetings are posted on devoted the public website:
http://www.water.ca.gov/climatechange/cctag.cfm

Project Deliverables/Timeline:

In addition to a broad array of technical and policy advice, the CCTAG will provide specific guidance on climate change scenario selection for the California Water Plan, and other planning efforts of the Department, including DWR Framework guidance climate change approach recommendations.

Customers:

In general, the Department of Water Resources is the customer. Specific customers within DWR include the California Water Plan, the Climate Change Framework Team, which is developing guidance on the selection of climate change scenarios, approaches and project-level analytical tools, and other groups, including IRWM, Flood Management, and the Natural Resources Agency, on the incorporation and consistency of climate change in planning studies and projects.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

California Water Plan Update – Climate Change (CWP)

Sponsor/Program Manager	John Andrew, Paul Massera, Lew Moeller
Project Manager	Elissa Lynn

Project Objective:

Provide greater detail and regionally specific climate change information in Update 2013 than in Update 2009, including regionally appropriate and statewide adaptation and mitigation strategies, resource management strategies, and climate change scenarios decision support.

Project Description:

Climate change stems from a steady gradual increase in global temperatures that has been taking place over recent decades. Determining the local impacts of and response strategies to climate change in California involves climate modeling downscaled to the regional level. Current developments in climate science and research can provide guidance for projecting likely ranges of temperatures and precipitation changes by region. Responding to these hydrologic changes and reducing their impact are known as adaptation strategies. Reducing GHG (Greenhouse Gas) impacts by reducing energy consumption are known as mitigation strategies. Many adaptation and mitigation strategies are conducted at the regional level, so CWP update 2013 will include climate change in the regional reports, based on appropriate hydrologic impact, as well as statewide strategies in the broader document. Strategies and vulnerabilities to climate change will also appear in the Resource Management Strategies. This project will also be tasked with technical assistance to the Statewide Water Analysis Network choice of scenarios related to climate change impacts. These four approaches to incorporating climate change into CWP 2013 will improve upon the initial steps taken in CWP 2009 to include responses to climate change.

Funding Information:

Project Budget:	$648,000.00	**Funding Source:**	Prop 84

Project Start Date:	2010	**Project End Date:**	DATE IN PROGRESS N/A Climate change content submitted in Dec. 2013, with Water Plan release coming in 2014.

External Partners:

Public Advisory Committee, Statewide Water Analysis Network, Local Water Planners and IRWM's

Project Accomplishments for 2013:

Content was finalized for each Resource Management Strategy of the CWP 2013, providing assessment of whether each strategy provides climate change adaptation or mitigation benefit. Text and graphical content were finalized for each Regional Report of CWP Update 2013, related to appropriate temperature observations and projections, adaptation strategies and energy intensity of local water supplies. Text and graphical content were completed for two climate change sections of CA Water Today of the CWP 2013; Climate change and Sea Level Rise, and Water-Energy. The text and graphics were finalized for all hydrologic observations chosen to be included and for adaptation and water-energy nexus figures. Additional deliverables completed were climate change references and CWP 2013 Highlights. Additionally in 2013, statewide rain/snow trends were investigated, in support of a figure for CA Water Today, and a reference document to be released in 2014.

Project Deliverables/Timeline:

Final content was developed as listed in the Accomplishments above.

Customers:

California Water Plan, Public Advisory Committee, State Agency Steering Committee, The Public

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Analysis of Climate Change for the California Water Plan Update

Sponsor/Program Manager	Paul Massera
Project Manager	Rich Juricich

Project Objective:

Quantify alternative scenarios of future water demand and supply conditions and use to evaluate performance of potential water management responses for Water Plan Update 2013

Project Description:

The California Water Plan Update 2013 (CWP 2013) built upon the scenario planning begun in previous Updates and includes an analysis of the performance of different resource management strategies and response packages for the Central Valley under different assumptions about uncertain future conditions. The Water Plan evaluated the effect of different assumptions about uncertain future conditions including climate change on future water demand for all 10 hydrologic regions in California. A wide range of scenarios were developed that reflect uncertainty about future population growth, agricultural land use, climate conditions, water use rates, and other factors.

Uncertain future climate conditions are represented by diverse sequences of temperature and precipitation applied to geographically-disaggregated catchment areas in the Water Evaluation and Planning (WEAP) model. Some sequences were based upon projections of temperature and precipitation from global climate models (Atmosphere-Ocean General Circulation Models—GCMs). Others were based on historical observations and were designed to test the effects of drought conditions experienced in the recent past at different times in the future. The Climate Change Technical Advisory Group (Climate TAG) provided guidance to DWR about which specific sequences to evaluate that reflect a wide range of plausible climatic conditions and include periods of droughts similar to those experienced in recent decades.

A significant improvement to the Water Plan scenarios in Update 2013 is a quantitative look at the uncertainty surrounding future climate change when evaluating the performance of new resource management strategies. After consultation with its Climate Change Technical Advisory Group, DWR chose to include 22 alternative climate scenarios in the evaluation of future strategies. These include 12 climate scenarios identified by the Governor's Climate Action Team (CAT) for future climate change, 5 scenarios repeating historical climate with a severe 3 year drought offset by 10 years, and 5 scenarios repeating historical climate with a warming temperature trend offset by ten years . Each of the climate scenarios have separate estimates of future precipitation and temperature. Collectively these estimates provide planners with a range of precipitation and temperature that might be experienced in the future and are used with other factors to estimate future water demands.

The CWP Update 2013 evaluated 12 sequences of downscaled global predictions of temperature and precipitation, corresponding to the 12 model-emissions scenario combinations selected by the Governor's Climate Action Team (Maurer and Hidalgo, 2008). The GCMs used were:

1. CNRM-CM3 (France)

2. GFDL-CM21 (USA)

3. Micro32med (Japan)

4. MPI-ECHAM5 (Germany)

5. NCAR-CCSM3 (USA)

6. NCAR-PCM1 (USA)

The two emissions scenarios used were the A2 and B1 scenarios:

"The A2 SRES global emissions scenario represents a heterogeneous world with respect to demographics, economic growth, resource use and energy systems, and cultural factors. There is a de-emphasis on globalization, reflected in heterogeneity of economic growth rates and rates and directions of technological change. These and other factors imply continued growth throughout the 21st century of global GHG emissions. By contrast, B1 is a "global sustainability" scenario. Worldwide, environmental protection and quality and human development emerge as key priorities, and there is an increase in international cooperation to address them as well as to convergence in other dimensions. Neither scenario entails explicit climate mitigation policies. The A2 and B1 global emission scenarios were selected to bracket the potential range of emissions and the availability of outputs from global climate models" California Climate Action Team (2009).

Downscaled monthly temperature and climate projections were obtained from the downscaled climate dataset jointly developed by the Lawrence Livermore National Laboratory (LLNL), the U.S. Department of the Interior, Bureau of Reclamation (Reclamation), and Santa Clara University (SCU), available at http://gdo-dcp.ucllnl.org. These data were derived from the World Climate Research Programme's (WCRP) Coupled Model Intercomparison Project Phase 3 (CMIP3) multi-model dataset, and include data from 112 different global climate simulations of 16 global models evaluated for three global emissions scenarios. The projections are available from 1950 to 2099.

Funding Information:

Project Budget:	$750,000	**Funding Source:**	Proposition 84

Project Start Date:	July 2010	**Project End Date:**	DATE	12/31/2013
			IN PROGRESS	
			N/A	X

External Partners:

MWH, RAND Corporation, Stockholm Environment Institute, National Center for Atmospheric Research

Project Accomplishments for 2013:

Project and deliverables completed in 2013, as developed.

Project Deliverables/Timeline:

- Nine growth scenarios for California describing alternative values for uncertain factors like population growth, land use changes, socioeconomic conditions, technological advancement, and institutional and political changes
- Up to 22 scenarios of future climate conditions (precipitation, temperature) for all Central Valley planning areas selected with advice from the Climate Change Technical Advisory Group
- 13 scenarios of future climate conditions (precipitation, temperature) for California's ten hydrologic regions.
- Quantification of future water demands for California's ten hydrologic regions reflecting the nine growth scenarios and up to thirteen future climate scenarios
- Quantification of future water supplies and demands reflecting the nine growth scenarios and up to twenty-two future climate scenarios for all Central Valley planning areas
- Performance criteria for evaluating effectiveness of regional water management responses
- Evaluation of many alternative water management responses using Robust Decision Making for all Central Valley planning areas

Customers:

- Department of Water Resources for support of DWR programs and projects
- Local and regional water planning entities for consideration of alternative future scenarios and water management responses
- California Legislature to meet Water Code requirements
- General public for education on future water issues
- Water Plan advisory groups including the Public Advisory Committee, State Agency Steering Committee, Statewide Water Analysis Network, and Regional Forums.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Basic Data Workgroup

Sponsor/Program Manager	Elissa Lynn, Greg Smith, Michael Anderson
Project Manager	Aaron Cuthbertson

Project Objective:

Assessment and coordination of basic climate data collection efforts across DWR

Project Description:

DWR's Climate Change Basic Data group is composed of representatives from DSIWM and the Division of Flood Management, and DWR's regional offices. The project goals are to assess current climate data acquisition efforts at DWR, promote cooperation and coordination across programs, and strategize on issues of data storage, management, and dissemination.

Funding Information:

Project Budget:	$120,000	**Funding Source:**	Prop 84

Project Start Date:	May 2011	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

Western Regional Climate Center

Project Accomplishments for 2013:

The Basic Data Workgroup began in 2011, with monthly meetings to strategize on data collection and management issues within DWR. A draft Memorandum Report on snow/rain trends in California was completed during 2013, with a final version to be completed in early 2014. A partnership with the Western Regional Climate Center (WRCC) continued for coordination of statewide climate data collection, storage and dissemination. DWR volunteer climate data collectors were contacted, and encouraged to join the CoCoRaHS network.

Project Deliverables/Timeline:

During 2013, the Basic Data workgroup will focus on continued strengthening working relationship with the WRCC, inventorying old climate records in the regional offices, and working on integrating existing data collection and management within DWR. New projects on research into snow and rain trends, using DWR and other data sources will be conducted. DWR volunteer climate data observers will continue to be encouraged to migrate to the CoCoRaHS network.

Customers:

State of California Agencies, General Public, DWR Staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Data Collection and Climate Services

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Dr. Michael Anderson

Project Objective:

Collect relevant climate data to support Department's emergency response and planning initiatives and monitor for climate change; provide relevant climate data and value added products to general public

Project Description:

In 2011 DWR continued its development of the Flood Emergency Response Information Exchange (FERIX). Efforts are underway to link information presented in FERIX to the climate data in the California Climate Data Archive. FERIX will also house a new map-based server for (former State Climatologist) Jim Goodridge's precipitation Depth-Duration-Frequency curves and annual extremes data sets that make up Bulletin 195. This will greatly facilitate the serving of the data which is currently handled through an ftp site with over 4000 spreadsheets. Data gathering for this effort will be transitioned from Jim Goodridge to DWR in the coming years.

For observing data systems, DWR is continuing its partnership with the Earth Systems Research Lab of the National Oceanic and Atmospheric Administration (NOAA) and Scripps Institution of Oceanography to deploy new monitoring equipment for extreme precipitation events. For this network, water vapor measurements, wind profilers, soil moisture sensors and freezing level radar are being deployed across the state. The data from this network is currently served through NOAA's Hydrometeorology Testbed website at http://hmt.noaa.gov. Efforts continue to get the data into the California Data Exchange Center. Other observing opportunities that are in their initial stages include elements of the Forecast Coordinated Operations Program and the UC Merced observing system in the American River watershed. A new remote sensing monitoring effort using airborne LIDAR measurements of the snowpack is being developed under a joint project between DWR and NASA's Jet Propulsion Laboratory. NOAA has stopped funding for the new Regional Climate Reference Network and is considering streamlining the National Weather Service Cooperative Observer Network.

Funding Information:

Project Budget:		**Funding Source:**	N/A

Project Start Date:	July 2009	**Project End Date:**	DATE / IN PROGRESS / N/A X

External Partners:

NOAA ESRL, Scripps, Jim Goodridge

Project Accomplishments for 2013:

Prototype map server, beta version desktop tool, site installations for extreme precipitation monitoring

Project Deliverables/Timeline:

Map based server for B195 data, desktop updating toolkit, full EPN sites with data flow to CDEC

Customers:

DWR, General Public

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Using Downscaled Climate Change Information for Water Resources Planning

Sponsor/Program Manager	Francis Chung
Project Manager	Jianzhong Wang, Hongbing Yin, Francis Chung

Project Objective:

Evaluate Downscaled Climate Model Projection Products for Use in Water Resources Planning

Project Description:

Climate change projections from Global Climate Models (GCMs) typically provide information at a scale that is too large to use for water resource planning. To make the climate change projection information more useful for planning purposes, it is converted to a smaller scale by a process called downscaling. Downscaling methods fall into two categories, statistical downscaling, which is based on historical patterns, and dynamical downscaling, which relies on physical principles and relationships. Both downscaling and the use of downscaled data for water resources planning are evolving areas of research. DWR's activities related to downscaling included:

- Created downscaled data at 2km resolution for California from PRISM-based Bias Corrected Spatial Downscaled (BCSD) data and associated uncertainty estimates
- Comparing dynamical and statistical downscaling methods to better understand the strengths and weaknesses of each method and how that might affect their use for water resources planning purposes
- Generating climate change reservoir inflow projections through a process called double quantile mapping
- Assessing climate change impacts for the Bay Delta Conservation Plan project
- Submitted paper titled "Isolated and integrated effects of sea level rise, seasonal runoff shifts, and annual runoff volume on California's largest water supply" to the *Journal of Hydrology*

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	4/2008	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

N/A

Project Accomplishments for 2013:

No Update Provided for 2013.

Project Deliverables/Timeline:

Develop A New Validation Strategy to Climate Change Impact Study Approaches**.** The product: climate model projections for use in climate change impact study on CVP/SWP

Customers:

DWR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sensitivity Analysis of Sierra Nevada and Coastal Range Upper Watersheds to Temperature Changes Using SWAT

Sponsor/Program Manager	Francis Chung
Project Manager	Tariq Kadir

Project Objective:

To develop calibrated rainfall/runoff models for the upper watersheds of the Sierra Nevada and Coastal Range mountains for areas tributary to the Sacramento – San Joaquin Delta and determine impacts on stream outflows caused by air temperature warming of 1^0C to 4^0C.

Project Description:

Physically-based, distributed hydrologic models are essential tools for evaluating long-term hydrologic changes in California. The semi-distributed Soil Water Assessment Tool (SWAT) is being used to develop individual models of eighteen watersheds of the Sierra Nevada and Coastal Range mountains for areas Tributary to the Sacramento – San Joaquin Delta. A common and consistent database of digital elevation, land use, soil and climate data are used with GIS to develop the SWAT models. Model calibration and validation are based on observed or reconstructed monthly unimpaired streamflows at the watershed outlets. The parallel optimization package is used in model calibration. The calibrated models will be used to study the effect of imposed warming of 1^0C to 4^0C on the hydrology of these source watersheds and their impacts on water supply of the Central Valley of California.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2010	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

None

Project Accomplishments for 2013:

No Update Provided for 2013.

Project Deliverables/Timeline:

Tangible Products to date:

1. Computer based rainfall/runoff models for 17 watersheds in the Sierra Nevada and Coast Range mountains have been developed and calibrated for outflows based on observed or reconstructed streamflows.
2. For seven of the watersheds temperature warming of 1^0C to 4^0C was imposed and impacts on outflows determined.

Future Products:

1. Development and calibrated computer based rainfall/runoff models for other minor watersheds in the Sierra Nevada and Coastal Range mountains and determining impacts of imposed warmings on outflows.
2. A pre-development C2VSIM integrated model for Central Valley, to be coupled with SWAT or BCM models for climate change study.
3. Use the developed models to determine the impacts of potential global warming using downscaled GCM results as input.

Customers:

Federal, State, Local, and Private stakeholders in California interested in the impacts of potential climate change on stream flows for areas tributary to the Sacramento – San Joaquin Delta.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Represent DWR in Interagency and Stakeholder Groups

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Regional Climate Staff

Project Objective:

For regional DWR staff to represent DWR in a variety of interagency and stakeholder groups within California

Project Description:

Federal, state, and local agencies, as well as other entities, have been convening workgroups to facilitate discussions in preparing for climate change, to understand the dynamics of water management and the interaction with managing other resources, and to implement the measures identified in the *2009 California Climate Adaptation Strategy*. Regional DWR staff represents DWR in these discussions, communicates the agency's perspectives, provides technical expertise and climate change resources, and reports to the Climate Change Program on relevant information that DWR can use in its own departmental activities.

Funding Information:

Project Budget:	$60,000/year	**Funding Source:**	Prop 84

Project Start Date:	January, 2010	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

Federal, state, and local agencies, water and electrical providers, teachers, and non-profit entities

Project Accomplishments for 2013:

Regional DWR staff participated in the following workgroups: the California Department of Fish and Wildlife (CDFW) State Wildlife Action Plan (SWAP) Stakeholder Workgroups; the Climate Action Team (CAT) Biodiversity Working Group; the CAT Climate Change, Land Use, and Infrastructure (CCLU-In) Working Group; California Landscape Conservation Cooperative (CA-LCC); the Baylands Ecosystem Habitat Goals Technical Update Steering Committee; the Bay Area Ecosystem Climate Change Consortium; and the California Water-Energy Coalition (CalWEC). Staff was also an active participant in the Communications Committee of CalWEC. As a Steering Committee member of the CA-LCC, staff helped develop the CA-LCC draft five-year strategic plan and participated on the science subcommittee.

Staff continued to assist the Fossil Discovery Center of Madera County in developing an exhibit on climate change, which will be completed in early 2013. Staff also assisted Project WET (Water Education for Teachers) by participating in teacher workshops and providing relevant presentations to facilitate the development of water resources and climate change curriculum. Staff continued to support the CoCoRaHS (Community Collaborative

Rain, Hail, and Snow Network) non-profit group as part of DWR's Climate Change Program "Citizen Science" outreach initiative. Staff offered support to local Resource Conservation Districts and provided presentations for local volunteer weather monitoring programs. Staff also collaborated with the CDFW's Going Green Team to coordinate DWR's sustainability efforts related to business management practices and policy.

In addition, regional staff provided comments and participated in a meeting for a draft proposal developed by the Los Angeles County Flood Control District (LACFCD) to do a Los Angeles Basin Stormwater Conservation Study with the U.S. Bureau of Reclamation (USBR). This basin study was approved to proceed in December, 2012. Staff will be involved with the Stakeholders Technical Advisory Committee for that basin study, which will include downscaling climate change and hydrologic modeling. Also, as cost-share partners, regional staff is working collaboratively with the USBR and the State of Oregon's Water Resources Department to perform the Klamath Basin Study. Staff is involved with the Technical Working Group of that Klamath Basin Study, which is a comprehensive assessment to define current and future imbalances in water supply and demand, to evaluate the effects of climate change on water supply and demand, and to develop and analyze adaptation and mitigation strategies to resolve imbalances in the Klamath Basin.

Project Deliverables/Timeline:

2013:

- DFW SWAP Stakeholder Group products: Climate College (October 2012-May 2013)
- CAT Biodiversity and CCLU-In Working Groups – California Climate Adaptation Strategy Update
- CA LCC final five-year Strategic Plan
- Climate change exhibit at the Fossil Discovery Center of Madera County
- LACFCD/USBR Basin Study products: Water Supply and Demand Projections report (August 2013); Downscaled Climate Change and Hydrologic Modeling report (September 2013)

2014:

- Baylands Ecosystem Habitat Goals Technical Update – final report expected summer 2014
- CA LCC Science Plan
- Klamath Basin Study product: a series of nine technical reports and a final report

2015:

- SWAP report (tentative, 2015)
- LACFCD/USBR Basin Study product: Los Angeles Basin Stormwater Conservation Study Report (May 2015)

Customers:

Federal, state and local agencies, water and electrical providers, teachers, non-profit entities, and DWR climate change program

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

California-Netherlands Water Resources Cooperation and Exchange

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz

Project Objective:

DWR has formed a cooperative partnership with the Rijkswaterstaat in the Netherlands to exchange information and expertise about topics of common interest.

Project Description:

In March 2011, a delegation from the Dutch Rijkswaterstaat visited California for a series of discussions and tours of California water facilities. In February 2012, a Letter of Intent was signed between DWR and the Rijkswaterstaat to continue cooperation and information exchange in the areas of integrated water management, operational water management, and policy planning on water management with special consideration to the impacts of climate change on those aspects of water management.

Project Accomplishments for 2013:

In 2013, DWR staff had a series of conversations with Rijkswaterstaat staff to further detail and articulate the specific areas of interest where continued collaboration and information exchange between the two agencies will occur. Climate Change staff have identified several areas of interest including:

- *Measuring climate change vulnerabilities*
- *Assistance to local and regional managers with assessing climate change vulnerabilities and impacts*
- *Scenario selection for climate change analysis*
- *Improving projections of future flooding and storm surge*
- *Assessing the relative importance of climate change impacts in relation to other potential drivers of change*
- *Communication of climate change impacts*
- *Integration of watershed, habitat, forest, and hazard management planning activities*

Funding Information:

Project Budget:	0	**Funding Source:**	

Project Start Date:	2012	**Project End Date:**	DATE / IN PROGRESS / N/A X

External Partners:

Rijkswaterstaat of The Netherlands

Customers:

OPERATIONS

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Evaluation of Benefits of Reoperation of Water Supply and Flood Protection Systems

Sponsor/Program Manager	Kamyar Guivetchi
Project Manager	Sean Sou

Project Objective:

Improve water supply reliability and flood protection, and ecosystem restoration and protection

Project Description:

The California Department of Water Resources (DWR) is conducting a system reoperation study (SRS) in cooperation with other State and federal agencies, local water districts, groundwater managers, and other stakeholders, to identify potential strategies for reoperation of the statewide flood protection and water supply systems. The opportunity to reoperate portions of California's statewide water system to yield increased water resources-related benefits was recognized by the State Legislature in Senate Bill X2 1 (SB X2 1) (Perata, 2008 – Water Code Section 83002.5).

In support of the legislative objectives, DWR developed the SRS to identify viable reoperation strategies and understand how integrated management can:

- Improve the reliability of municipal and irrigation water supply
- Reduce flood hazards
- Restore and protect ecosystem function and habitat conditions
- Buffer the hydrologic variations expected from climate change
- Improve water quality

Development of the SRS is a multi-phased effort that includes:

- Phase 1 – Plan of Study – Completed 2011
- Phase 2 – Strategy Formulation and Refinement - Completed 2013
- Phase 3 – Preliminary Assessments of Strategies – Planned to be completed in 2015
- Phase 4 – Reconnaissance Level Assessments of Strategies – Planned to be completed in 2017

The system reoperation strategies will be analyzed with appropriate climate change scenarios and evaluated for their ability to reduce or minimize climate change impacts to water supply, flood management, and the ecosystem. System reoperation which involves primarily the use existing storage infrastructure and conveyance systems, such as conjunctive use of surface water and groundwater, could help reduce climate change impacts including reduced snowpack, more precipitation in the form of rain, and early snow melt.

Funding Information:

Project Budget:	$10,000,000	**Funding Source:**	Prop. 84

Project Start Date:	2010	**Project End Date:**	Fall 2017

External Partners:

N/A

Project Accomplishments for 2013:

Completed the draft Phase 2 Report - Strategy Formulation and Refinement along with the Tradeoff Analysis Report and the Forecast-Based Operations Report.

Project Deliverables/Timeline:

Phase 3 Report: Preliminary Assessments of Strategies – Planned to be completed in 2015

Phase 4 – Reconnaissance Level Assessments of Strategies – Planned to be completed in 2017

Customers:

General Public, California Legislators, Water management facilities owners and operators

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Impacts on California Water Rights Study

Sponsor/Program Manager	John Andrew
Project Manager	Andrew Schwarz

Project Objective:

Evaluate the potential impact of climate change on existing water rights in California

Project Description:

This project will look at how changing streamflow as a result of climate change could potentially impact the ability of water rights holders to exercise their water rights. As the amount and timing of surface water flows change the ability of water rights holders to divert water as they have in the past is expected to change. This study will attempt to quantify those changes and discuss the potential impacts to water users and other sources of water if such changes occur.

Funding Information:

Project Budget:	$50,000	**Funding Source:**	N/A

Project Start Date:	2013	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

None

Project Accomplishments for 2013:

In 2013, a final scope of work and plan of study were developed for this project. In addition, during 2013 investigations took place into a variety of different approaches to analyze the impact of climate change on California water rights. Because California has a very complex water rights system and monitoring and data collection of actual diversions and water use have been spotty and lack precision and accuracy, analyzing the effect of changing streamflow on water rights is not straightforward. In 2013, after an exhaustive investigation, the water rights contract provision Term 91 and the associated Supplemental Project Water calculation were decided on as a proxy metric for water scarcity and water rights conflict for the study.

Project Deliverables/Timeline:

Completion of Draft Paper for review 5/2014. Publication of final paper by 12/2014

Customers:

California water policy makers and water rights holders. State Water Resources Control Board.

ENERGY & GREENHOUSE GAS EMISSIONS

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Resource Plan for the State Water Project

Sponsor/Program Manager	William Forsythe
Project Manager	Veronica Hicks

Project Objective:

A 20 year resourcing plan (updated every 3 years) under which the long-term energy needs of the State Water Project's (SWP) would be met.

Project Description:

The Integrated Resource Plan (IRP) is a resourcing plan outlining strategies under which the long-term energy needs of the State Water Project's (SWP) would be met. The IRP considers a balanced approach to meeting the operational, economic, and policy needs of the SWP's water delivery requirements. One component of the IRP is a renewable resources procurement plan that will keep SWP operations consistent with the GHG reduction goals outlined is DWR's Climate Action Plan which incorporates the Governor's Executive Order S-03-05 and AB 32.

In developing the IRP, DWR considers numerous operational and regulatory constraints and objectives the SWP is committed to meeting:

- Reliable water deliveries;
- Affordable and sustainable water deliveries;
- Protection of the natural environment;
- Responsibilities under regulatory authorities; and
- State and federal environmental policy goals.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2006	**Project End Date:**	DATE: IN PROGRESS: N/A X

External Partners:

State Water Contractors

Project Accomplishments for 2013:

No Update Provided for 2013.

Project Deliverables/Timeline:

Triennial update to the IRP and renewables procurement plan will be completed in Summer 2013.
Enter into a contract for renewable resources under the 2012 renewable request for proposal (RFP), Spring 2013.
Long-term power purchase agreement for energy from RG Unit No. 4 will terminate in Summer 2013.
Completed the standard block purchases recommended as part of IRP09 by Summer 2013.
Complete the power planning portion of the Edmonston value engineering study following O&M's efficiency tests (by Spring 2014.
Complete initial studies of additional small hydro power plants at or adjacent to SWP facilities in 2014.

Customers:

State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

2012 Emissions Reports to the California Air Resources Board (CARB)

Sponsor/Program Manager	Veronica Hicks
Project Manager	Ram Verma/Veronica Hicks

Project Objective:

Reporting and verification of 2012 Greenhouse Gas (GHG) emissions.

Project Description:

In May 2013, DWR reported its GHG emissions to the CARB for the emission year 2012. The report included energy generated and consumed by the SWP, GHG emissions due to energy imported from RG4, and SF6 emissions associated with the SWP's switchyard circuit breakers. To meet its compliance obligation for the Cap and Trade program, DWR participated in GHG allowance auctions conducted by CARB.

Funding Information:

Project Budget:	$	**Funding Source:**	

Project Start Date:	01/02/13	**Project End Date:**	DATE 12/3101/13 N/A

External Partners:

California Air Resources Board

Project Accomplishments for 2013:

In 2013, DWR reported its 2012 GHG emissions to CARB. The reported emissions were verified by a third party verifier. DWR purchased allowances to meet its compliance obligation for the Cap and Trade Program.

Project Deliverables/Timeline: What are the current or future objectives of the project? Create a list of tangible products that have/will result(ed) from project.

Current Objectives:

1. Compliance with mandatory reporting requirements of AB32
2. Monitoring of emissions and quantities of SF6 and fuels
3. Third party verification of the reported emissions

4. Compliance with CARB's Cap and Trade program

Future Objectives:
1. Compliance with CARB's Cap and Trade program
2. Tracking and reducing GHG emissions

Tangible results that will result from the project:
1. Compliance with AB32 regulation
2. Compliance with CARB's Cap and Trade Program
3. Optimized compliance cost
4. Reduced GHG emission
5. Optimized fuel usage
6. Availability of emission reports

Customers:

Public, CARB and State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Mitigation Team

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Qinqin Liu

Project Objective:

GHG emission reduction in water resource management and planning to implement AB 32 Scoping Plan for climate change mitigation

Project Description:

DWR major actions for GHG emission reduction related to water- energy efficiency for water resource management and planning include 1) developing qualitative and quantitative framework for water-energy and GHG reduction in California Water Plan Update, 2) providing outreach for agriculture water use efficiency, 3) contributing to WETCAT Climate Action Team management actions and coordinating with the WETCAT agencies for AB 32 Scoping Plan implementation and update, 4) coordinating urban and agricultural water management as well as integrated regional water management programs regarding water energy efficiency and GHG emissions reductions, 5) working with DWR carbon offset work team for GHG reduction in water sector.

Funding Information:

Project Budget:	$300,000	**Funding Source:**	AB 32

Project Start Date:	2011	**Project End Date:**	DATE / IN PROGRESS / N/A X

External Partners:

WETCAT agencies, agriculture and urban water organizations, the public

Project Accomplishments for 2013:

I. Developed water-energy framework to address water-energy and climate mitigation issues in CA Water Plan Update, including 1) water-energy connection (Volume 1, California Water Today); 2) estimated energy intensity required for the extraction and conveyance of water from ten hydrological regions in California (Volume 2, the Regional Reports); 3) Resource Management Strategies identifying water management actions that could reduce energy consumption and associated GHGs (Volume 3, Resource Management Strategies).

II. Coordinated with WETCAT agencies and developed draft AB 32 Scoping Plan update in water sector, reviewed Governor's Water Action Plan, and provided leadership to complete the State Climate Change Action Research Plan in water sector, and prepared Climate Change Action Research Plan related to water, energy and food.

III. Other project accomplishments include: 1) Provided climate change guidance on Agricultural Water Management Plans, 2) developed recommendations regarding water-energy actions related to Urban Water Management Plans, and grant programs for Urban Water Management and Integrated Regional Water Management, 3) completed grant contract project for urban water conservation and climate change modeling.

IV. Continued to provide outreach for agriculture water conservation by working with the Conservation Agriculture Systems Institute and the Center for Irrigation Technology,

Project Deliverables/Timeline:

DWR will complete Water-Energy related climate change report and related reference information as well as climate change – agricultural water management handbook by December 2014. DWR will also organize WETCAT meeting in May 2014 with presentations on regional energy intensity data and how to use these regional data to support CPUC water and energy efficiency programs with cost effective investments.

Customers:

WETCAT agencies, agriculture and urban water organizations, the public.

BUSINESS PRACTICES & TECHNICAL EXPERTISE

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

DWR Climate Change Program

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn/Michael Healey

Project Objective:

The Climate Change Program supports all climate change activities across the Department. Specialists in both adaptation and mitigation are located throughout the regional offices, and headquarters. Program goals include providing regionally-specific climate change information to programs, projects, and documents, by accessing and synthesizing research, data, tools, and topical content for California's unique water management issues with regard to a warming climate.

Project Description:

DWR has had a climate change program since 2009. Executive Manager for Climate Change, John Andrew, expanded the program to provide a team of climate change specialists to serve Department and public on issues related to climate change and water management. Members are matrixed across and the Statewide Integrated Water Management and Integrated Regional Water Management Divisions. In 2013, the program hired a Senior Engineer, Water Resources.

The Climate Change program receives funding from Proposition 84, and fees from the Air Resources Board under Assembly Bill 32 (Global Warming Solutions Act). Seven full time staff are supported by Prop 84, with two supported by AB32. Additional climate change support is provided by Executive, and Water Use Efficiency.

Funding Information:

Project Budget:	$2.5 M/year	**Funding Sources:**	Proposition 84 and AB 32

Project Start Date:	2009	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:

Matrix managed across multiple divisions of DWR.

Project Accomplishments for 2013

Climate Change Program staff conducted or supported many of the projects listed in this Annual Report. In addition, the program held four Climate Change Matrix Team meetings in2013, for internal coordination on projects and topics related to climate change and water management. The Climate Change team metbiweekly, as did subgroups on mitigation and data collection. Program staff developed a 5-year strategic plan, tying individual work plans to program objectives, to be released in 2014.

Project Deliverables/Timeline:

The program has funding that should support all activities of the climate change program through FY 15/16.

Customers:

California Water Plan, Integrated Regional Water Management, and FloodSAFE program. The program also provides support to the Governor's Climate Action Team.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change Matrix Team

Sponsor/Program Manager	Gary Bardini
Project Manager	John Andrew

Project Objective:

Communication and coordination of climate change activities across DWR

Project Description:

DWR's Climate Change Matrix Team includes representatives from every division and major program in the Department. The team of approximately 40 staff (membership is on the last page of the annual report) meets quarterly to communicate and coordinate on climate change issues. Meetings regularly feature an external speaker on climate change, Department and State policy discussion, and an update from the State Climatologist.

Funding Information:

Project Budget:	$40,000	**Funding Source:**	Various

Project Start Date:	March 2007	**Project End Date:**	Ongoing

External Partners:

None

Project Accomplishments for 2013:

The matrix team focused on Phase III (vulnerability assessment/adaptation plan) of DWR's Climate Action Plan (CAP).

Project Deliverables/Timeline:

During 2014, the matrix team will continue its emphasis on CAP Phase III. In addition, a re-commitment to internal communication/coordination may (again) be attempted.

Customers:

DWR management and staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Development of Internal DWR Policies on Climate Change Mitigation, Analysis, and Adaptation

Sponsor/Program Manager	John Andrew, Katy Spanos, Heidi Rooks
Project Manager	Phase I: Andrew Schwarz, Phase II: Andrew Schwarz and Erin Chappell, Phase III: Andrew Schwarz and Michelle Selmon

Project Objective:

Develop comprehensive DWR policies and procedures to guide climate change mitigation, analysis, and adaptation on activities performed by DWR.

Project Description:

In June 2009, the Director formally established the CEQA Climate Change Committee ("C4") to review all climate change analyses in DWR environmental documents and exemption considerations prior to publication. Since that time C4 has served as the key advisory board for all elements of climate change analysis in CEQA documents. Since 2008, C4 has reviewed and commented on tens of environmental impact reports and nearly 100 other Departmental environmental documents.

Over the past 5 years, C4's recommendations and approach to addressing climate change issues in CEQA documents has evolved and matured as new legislation and litigation has provided additional requirements, information, and context. In 2010, C4 began a three phase process to develop a comprehensive DWR Climate Action Plan which will contain internal policies to address climate change mitigation, effects analysis, and adaptation. **DWR staff, located in the four regional offices and headquarters, will continue to provide technical assistance to project managers and consultants throughout the department to implement policies and guidance developed by the C4.**

Phase I of the Climate Action Plan is a comprehensive DWR-wide Greenhouse Gas Emissions Reduction Plan that documents 1) DWR's actions to reduce GHG emissions from its activities consistent with AB 32 and Executive Order S-3-05 and 2) Complies with the requirements of CEQA Guidelines section 15183.5 for "Plans for the reduction of greenhouse gas emissions" that can be relied on in subsequent project specific analysis.

Phase II of the Climate Action Plan will be a guidance framework and data toolbox to guide incorporation of climate change in future planning analysis of DWR projects and activities. Completion of Phase II will result in a guidance document and an accompanying climate scenario toolbox to assist DWR project managers with assessing the need for climate change analysis in their planning activities and guiding decision making for selection of analytical tools and analysis procedures, as well as, assumptions about future conditions. The guidance framework will ensure that DWR projects meet standards for consistency, quality, and adequacy in climate change analysis. This phase of the Climate Action Plan builds on the December 2010 publication of "Climate Change Characterization and Analysis in DWR Planning Studies" by Abdul Khan and Andrew Schwarz. This foundational document is a comprehensive and comparative review of planning studies conducted by DWR and its partner agencies that have addressed climate change.

Phase III of the Climate Action Plan will be a DWR Climate Change Resiliency and Adaptation Plan. This plan

will review DWR owned and operated facilities and DWR's activities throughout the state, conduct a vulnerability analysis of these facilities and activities and develop resiliency and adaptation strategies for the department to prepare and protect DWR's assets and services from expected change in climate.

Funding Information:

Project Budget:	$300,000	**Funding Source:**	N/A

Project Start Date:	2009	**Project End Date:**	DATE	IN PROGRESS	N/A
				X	

External Partners:

Phase I: California Attorney General's Office, OPR. Phase II: DWR Climate Change Technical Advisory Committee Phase III: TBD

Project Accomplishments for 2013:

Phase I: Completion of DWR GHG Emissions Reduction Plan (GGERP) March 2012, Completion of CEQA review May 2012, formal adoption of GGERP by DWR Director Cowin May 24, 2012. Full implementation of GGERP began June 1st, 2012. **Phase II:** Continued work with CCTAG to evaluate climate change scenarios and analysis methods. Staff have developed a scenario selection roadmap and screening procedure with the CCTAG and hold monthly working group sessions with the CCTAG Scenarios Subgroup. Work is also continuing on a data toolbox that will include historical climate change analysis data as well as newly developed tools and data. All historical data has been compiled and metadata is being developed for these climate change scenarios.
Phase III: An interdisciplinary team has been assembled to develop the Vulnerability Assessment for DWR facilities and activities, analyses have already been conducted and are nearing completion for wildfire and extreme heat impacts. The interdisciplinary VA/AP team meets each week to collaborate on progress and discuss data, tools and analytical approaches.

Project Deliverables/Timeline:

Three Phase Climate Action Plan: Phase I completion in 2012, Phase II completion in 2014, Phase II completion 2015.

Customers:

DWR project managers

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Monitoring and Tracking of Implementation of DWR Greenhouse Gas Emissions Reduction Plan

Sponsor/Program Manager	John Andrew, Katy Spanos, Heidi Rooks
Project Manager	Andrew Schwarz

Project Objective:

Monitor and track implementation of DWR Greenhouse Gas Emissions Reduction Plan to meet the commitments laid out in the Plan and ensure that DWR is on course to meet its GHG emissions reduction goals.

Project Description:

With the adoption of the DWR Greenhouse Gas Emissions Reduction Plan (GGERP) on May 24th, 2012 DWR committed to substantial GHG emissions reduction goals (Near-term: Reduce GHG emissions to 50% below 1990 levels by 2020; Long-term: Reduce GHG emissions to 80% below 1990 levels by 2050). DWR also committed to annual tracking and reporting of GHG emissions and a quinquennial review of progress toward achievement of goals and re-evaluation of GHG emissions reduction strategies if necessary.

Funding Information:

Project Budget:	$50,000	**Funding Source:**	N/A

Project Start Date:	2012	**Project End Date:**	DATE IN PROGRESS N/A On-going through 2050

External Partners:

The Climate Registry

Project Accomplishments for 2013:

A general protocol and procedures have been developed for tracking and reporting annual emissions. 2011 Emissions have been documented and are currently being reviewed (as of February) and will be posted on the DWR Climate Change webpage (/CAP.cfm) when complete.
Initial discussion have taken place with DWR's Sustainability Coordinator and the new Water and Energy Efficiency Office to develop a proposal to use the "Carbon Impact" software package to track GHG emissions from construction in the future, which would improve the accuracy and timeliness of emissions estimates for future reporting.

Project Deliverables/Timeline:

On-going monitoring and reporting of DWR GHG emissions consistent with the GGERP each year, Quinquennial evaluation of progress toward meeting GGERP GHG emissions reduction goals.

Customers:

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sustainability

Sponsor/Program Manager	Dale Hoffman-Floerke /Laura King Moon
Project Manager	Mary Simmerer

Project Objective:

DWR will be a sustainability leader within State government and the California water community

Project Description:

DWR has established a Sustainability Policy, which received approval from former DWR Director Snow, on April, 22, 2009. DWR's Sustainability Policy embodies the goals and directions the Department will take to be a sustainability leader within State government and the California water community. The policy sets initial targets in the following areas:

- Carbon- 50% reduction below 1990 levels by 2020 (consistent with the AB 32 Scoping Plan); 80% reduction below 1990 levels by 2050 (EO S-0-05)
- Energy- Progressive acquisition of 360 GWh of renewable energy resources by 2020; reduce grid-based retail energy demand 20% by 2015; ensure Energy Star purchasing (EO S-2-04)
- Wastewater- Incorporate recycled wastewater and/or greywater into facilities if technically feasible and cost-effective
- Waste- 50% diversion form waste stream by 2020 (AB 1016)
- Water- 20% reduction in per employee water use by 2020 (consistent with SB 7x-7)

Funding Information:

Project Budget:		**Funding Source:**	N/A

Project Start Date:	April 22, 2009	**Project End Date:**	DATE IN PROGRESS N/A X

External Partners:

None

Project Accomplishments for 2013:

2013 Sustainability Accomplishments

Sustainability activities for DWR in 2013 focused both on education and awareness of Sustainability practices and principles, as well as implementing various Sustainability activities. Following is a list of significant 2013 sustainability

accomplishments and efforts. *(For the reader's convenience, the list is grouped alphabetically by activity.)*

- **Agency Sustainability Coordination Efforts**
    - California Water Plan- Development of Sustainability Indicators.
        - The California Water Plan, updated every five years, presents the status and trends of California's water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios. The plan also evaluates different combinations of regional and statewide resource management strategies to reduce water demand, increase water supply, reduce flood risk, improve water quality, and enhance environmental and resource stewardship. The evaluations and assessments performed for the plan help identify effective actions and policies for meeting California's resource management objectives in the near term and for several decades to come. A Sustainability indicator framework, along with proposed targets and goals has been developed and is moving through the public comment phase. The Sustainability Indicators are expected to work within DWR's Integrated Water Management program over time.
    - Review of various Department Documents for inclusion of Sustainability principles.
        - Sustainability principles at DWR are found across numerous programs. It is important that DWR relay these principals to the public with consistency and clarity. By reviewing major DWR documents for Sustainability principles, consistency of use and meaning is maintained. Some of the documents that contain Sustainability Principles include the Central Valley's Flood Protection Plan and the California Water Plan.
- **Committees: Updates & Accomplishments**
    - Agency Sustainability Coordinators.
        - This external group consists of other State Agency personnel who are involved in Sustainability activities within their respective agencies. The group meets monthly at DWR to discuss Sustainability issues within the public sector.
    - Carbon Committee
        - DWR established a committee to discuss on-going projects and issues with regards to legislative mandates on greenhouse gases, cap and trade issue and carbon sequestration.
    - Environmental Coordination Committee
        - The purpose of the ECC is to provide assistance to DWR staff to assure that DWR's activities that involve environmental considerations are in compliance with legal, legislative and policy mandates, and that work products are internally consistent. The ECC is a forum in which DWR staff discusses a wide range of topics from current regulatory issues, document protocols, environmental analyses and mitigation policies.
    - NRO Sustainability Committee
        - The Northern Regional Office is engaged in a Sustainability Pilot Project that looks to

implement Sustainability best practices. In 2013 the NRO committee monitored both its energy use and water use. The seasonality of the water use was clearly demonstrated as June, July and August water use increased dramatically due to landscape irrigation. Energy use was higher in from November through February as heating and lighting needs increased. NRO continues to work on both water and energy efficiencies in their building, and recently completed a project that will save on air conditioning costs..

- State Agency Green Employees (SAGE)
  - SAGE, originally known as the State Agency Recycling Coordinator's Committee (SARCC), is a group for State Recycling Coordinators and other employees involved with the State's Green efforts. Founded in April, 2008 SAGE was developed by employees of local Agencies who shared a need to communicate with other Agencies regarding meeting State mandates, materials reuse, recycling programs, and Environmentally Preferred Purchasing.
  - In May, 2008 the first SAGE meeting was held and Recycling Coordinators from eleven local agencies were introduced to the committee. Since then, SAGE has continued to grow and its network reaches over 42 agencies within the State
  - In May 2013 SAGE held its California Green Fair on the steps of the Capital.
- Sustainability Leads
  - This group meets bi-weekly to develop Sustainability Initiatives and Sustainability Best Practices. This group also makes annual recommendations on Sustainability Policy. In 2013, the group the group expanded its membership to include the newly formed water and energy efficiency unit.
- Sustainability Working Group
  - This group meets monthly to discuss Sustainability initiatives, perform pilot projects and make recommendations on DWR's Sustainability policies.
  - Policy Work
    - Waste Reduction Guidelines
      - Draft Waste Guidelines awaiting final review and recommendations
  - Subcommittees
    - Bike Committee
      - Supported May is Bike Month Activities
      - Held a September Climate Action Ride in partnership with State Parks and the TMA.
- Sacramento Transportation Management Association (TMA) Commuter Club
  - The Sacramento TMA is the oldest TMA in Sacramento and one of the largest in the country. Incorporated in 1989, the TMA has 165 members, representing more than 90,000

commuters. The Sacramento TMA serves employers, commuters and residents from the American River to Elk Grove and from the Sacramento River to 65th Street.

- Through DWR's membership in the TMA, DWR offers an employee commute program that puts the Emergency Ride Home vouchers online and offers commute information, incentives, and prizes. By using the incentives that TMA has to offer, DWR continues to promote Greenhouse Gases awareness and encourage alternate transportation.

- 2013 May is Bike Month
  - DWR participated in the Sacramento Transit Management Authority's "May is Bike Month" event. The event is held every May to encourage commuter biking and substitute bike riding for car trips. 2013's participation was almost identical to 2012's with 219 participants in 2013 versus 222 in 2012 and a total of 34,709 in 2013 versus 34,750 miles in 2012.
- 2013 October is Low Car Use Month Challenge
  - 48 DWR employees participated in Low-Car Use Month for a total of 1230 alternate transportation miles.
  - DWR hosted a fuel cell car display in conjunction with the California Fuel Cell Partnership (CFCP) Association. Two fuel cell vehicles were displayed while CFCP staff answered questions on fuel cell technology. An estimated 150 people attended the display.

- **Education and Awareness Activities**
  - Sustainability Collaboration Portal
    - Continued to maintain the Sustainability Collaboration Portal, a web-based tool containing an array of information, news articles, images, etc. on Sustainability. See https://sustainability.water.ca.gov
  - 2013 Earth Day Activities
    - A special presentation on fusion technology by Lawrence Livermore Laboratories was held during April to celebrate Earth Day. The presentation focused on the potential for fusion energy for replacing fossil fuels and presented the latest research. Nearly 300 people attended the two sessions.
  - 2013 November America Recycles Day
  - DWR hosted a presentation on a new Sacramento food recycling facility called "Clean World".. One of the first of its kind in the nation, CleanWorld has a Sacramento anaerobic digestion facility that expects to be processing 100 tons/day of source separated organics by 2014 and is already fueling 10 trucks daily with renewable CNG. The presentation featured the science behind the food recycling and discussed just how much food goes to waste every day in the Sacramento area.
  - 2013 Sustainability Section in Climate Change Class 201.
    - Two Climate Change classes featuring a Sustainability Section were taught in 2013.

- **Energy and Water Efficiency Efforts**

- DWR's water and energy efficiency unit has completed its energy benchmarking for DWR retail facilities. The unit will continue the identification and location of all DWR water sources and meters and will begin benchmarking water use at DWR.

- **Environmental Stewardship Principles**

  - DWR adopted Environmental Stewardship Principles in 2010 and in 2012 worked with the Department's Engineering Bulletin, Water Resources Engineering Memorandum (WREM) 58A to assure that the Principles were embedded into the Department's Engineering Practices. The new Bulletin, WREM 58B was adopted DWR in 2012 and ongoing efforts to implement the Principals continued in 2013. One of the significant outreach efforts is the inclusion of Environmental Stewardship Principles in the Envision portion of the Project Management Training. In 2013, twenty-seven people went through the Envision/Environmental Stewardship training.

- **Envision Training**

  - Perhaps the most significant Education activity was the introduction of the Envision™ rating tool for Sustainable Infrastructure (Envision Sustainable Infrastructure Rating System) into DWR's Project Management training. Envision™ is a tool that will help DWR implement Sustainability outcomes in its daily work. It also provides a common framework and vocabulary for DWR employees when discussing Sustainability at DWR. Envision™ is a tool for evaluating and rating the community, environmental and economic benefits of all types and sizes of infrastructure projects. The Envision ™ rating system evaluates, grades, and gives recognition to infrastructure projects that assess the sustainability over the course of the project's life cycle. In a two-day session, staffs learn how to use the rating system and learn how the Envision Rating System integrates with DWR's sustainability and environmental stewardship policies. Additionally, actual case studies of sustainable infrastructure projects are discussed. In 2013, twenty-seven people went through the Envision training. However, in 2014 nearly 400 people are scheduled to take the training.

- **Paper Reduction**

  - Launched in 2010, Documentum is an enterprise system for managing all record types including video, podcast, images and other digital records as well as traditional media storage such as paper and microfilm. This paper reduction process is on-going, but electronic storage is becoming increasingly main-stream at DWR. A Department of General Services inventory of public records is required every five years. The 2013 report is pending and will be an excellent benchmark of DWR progress in this area.

.**Reporting Sustainability Efforts**

- Annual Report

  - The 3st sustainability annual report was released in 2013, detailing events and accomplishments from 2012. That report may be accessed at:

  - https://sustainability.water.ca.gov/library/-/document_library/view/3364357

Transportation

  - Fuel Management Replacement System (FMRP)

- DWR's FMRP was launched in 2008 with the stated goals to identify and select a non-proprietary commercial grade fuel management system with pay-point functions (using the Voyager card) to replace the existing system. The system was finalized in 2013 going fully live in 2014. The intent was to provide site administrators with the capability to access real-time fuel data from a personal computer as well as provide accurate and immediate capture of fuel disbursement and cost distribution for fuel obtained by Department vehicles. Although not currently required by law, having an updated, integrated fuel management system also helps DWR track its greenhouse gases emitted from DWR's fleet.

Project Deliverables/Timeline:

- Carbon- 50% reduction below 1990 levels by 2020 (consistent with the AB 32 Scoping Plan); 80% reduction below 1990 levels by 2050 (EO S-0-05)
- Energy- Progressive acquisition of 360 GWh of renewable energy resources by 2020; reduce grid-based retail energy demand 20% by 2015; ensure Energy Star purchasing (EO S-2-04)
- Wastewater- Incorporate recycled wastewater and/or greywater into facilities if technically feasible and cost-effective
- Waste- 50% diversion form waste stream by 2020 (AB 1016)
- Water- 20% reduction in per employee water use by 2020 (consistent with SB 7x-7)

Customers:

DWR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Sustainable Facilities Operations - Greenhouse Gas (GHG) Initiatives

Sponsor/Program Manager	Executive
Project Manager	John Engstrom

Project Objective:

Reduce GHG attributed to Business Operations

Project Description:

DWR will identify, measure, and implement sustainable facility operation practices to reduce GHG, and educate employees in these practices. The sustainable facilities operations practices to make DWR "greener" will include reducing energy and resource consumption, while lowering greenhouse gas emissions and creating healthier working environments for DWR employees. The development of these enhanced business practices will include:

- DWR has integrated a document management system into its daily business operations. This type of system will reduce paper quantity and create an electronic system for tracking of approvals and electronic retention of documents to save time and resources.
- DWR will continue to promote the Environmentally Preferable Purchasing (EPP) program to utilize procurement methods that provide options for purchasing "green" products.
- DWR will increase its efforts to reduce, reuse, recycle, and rethink in all areas of DWR's daily business activities. DWR will look at continuing to increase its waste reporting metrics under SB 1016 by using annual waste disposal as a factor when evaluating program implementation.
- DWR will promote and implement energy, water efficiency, and conservation in all capital and renovation projects as well as operations and maintenance activities within budgetary constraints and programmatic requirements.
- DWR will promote ways to reduce employee business travel for meetings by use of technology such as teleconference centers or web casting. In addition, training webinars and other online training opportunities will be investigated to reduce training commute for employees.

Other actions in progress or in planning to promote a more sustainable business include:

- DWR will continue to educate through outreach activities like the annual Green Week event, *DWR News/People* articles, and *Current* announcements.
- DWR is participating in the green building certification program LEED (Leadership in Energy and Environmental Design). The State Water Project Southern Field Headquarters is currently being submitted to LEED to become DWR's first LEED Gold building.
- DWR will continue to provide an official office supply reuse center (Green Pastures) on the 3rd floor of the Resources Building for new, gently used, or open box office materials that are available to all DWR employees free of charge.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	Continuous Efforts	Project End Date:	DATE	IN PROGRESS	N/A
				X	

External Partners:

Department of General Services

Project Accomplishments for 2013:

- DWR implemented a Payroll Deduction Transit Pass Program in 2012 as part of its alternative commute program which subsidizes alternative transportation. During year 2013 it is estimated that the program has saved the Department approximately 50 to 60 hours a month in staff time while offering more transit fare options to purchase at work for DWR staff.
- DWR actively promotes commuting by bicycle. One of the efforts to increase this alternative mode of transportation is to encourage DWR staff to participate in the Sacramento's regional "May is Bike Month". DWR employees logged 34,709 miles for the month of May in 2013.
- DWR participated in Executive Order (EO) B-18-12, Green Building Initiative. DWR added retail water accounts to Energy Star Portfolio Manager. All State Agencies are required to reduce water use 10% by year 2015, and 20% by year 2020.
- DWR's Purchasing Services Office held purchasing workshops to update the department buyers about the Environmentally Preferable Purchasing Practices (EPP) program and why it is in the best interest for the Department to utilize this opportunity. The purchases are reportable in many cases under the mandated goals outlined in the Public Contract Code (PCC) (12153-12320) for buying recycled-content products (RCPs). The goal of this effort is to increase purchases of RCP's.
- DWR News/People- DWR has promoted sustainability through quarterly "DWR News/People" publication. The articles discuss accomplishments by DWR staff related sustainability at DWR.
- Green Award for Reduction of Waste Disposal- A DWR sustainability award was created to promote waste reduction and recycling within our Department. The recipient of this Diversion Award disposed the least amount of waste from 18 primary categories and six hazardous waste material categories. Delta Field Division is the most recent winner of this award.
- DWR took the lead in both organizing and participating in the annual California State Green Fair last May, 2013. This event brings both State Agencies and the private sector to publicize services and products that reduce energy and the States carbon footprint.
  DWR installed VDI (Virtual Desktop Infrastructure) Zero Client. This desktop-centric service has helped the department reduce energy usage by virtualizing all the components of the desktop.
- DWR has increased the number of bike racks at the Resources building. Due to an increase in demand and ridership, DWR has purchased and installed new racks to accommodate the rise in employees using alternative means of transportation.
- DWR has shown its commitment to sustainability by purchasing an all-electric vehicle (Nissan Leaf) for employee use. This pool vehicle has been so popular that the department will be purchasing an additional electric vehicle in 2014/2015.

Project Deliverables/Timeline:

Continuing GHG Reduction Measures

Customers:

DWR, and State Water Contractors

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Environmental Stewardship Policy

Sponsor/Program Manager	Executive
Project Manager	Ted Frink

Project Objective:

Implementation of the Environmental Stewardship Policy in DWR programs and projects

Project Description:

In October 2010 DWR's Director Mark Cowin established the inaugural Environmental Stewardship Policy. This policy is integral to advancing a Department-wide "Total Resource Management" approach to planning and design of projects. It sets forth the intent that DWR shall work towards the sustainability of public trust resources related to water resources management and the environment including strategies to address climate change impacts. The Policy states that DWR shall fully integrate environmental benefits, which include, but are not limited to, habitat protection and restoration/enhancement objectives and climate change adaptation in the planning, development, and implementation of operations, maintenance, and all projects under the authority of DWR. The Environmental Stewardship Policy commits DWR managers to consider, integrate, and design environmental stewardship attributes into DWR's water and flood management programs and projects in several ways: integrate ecosystem protection and restoration into water storage and conveyance and flood control/management planning and implementation; include environmental stewardship and ecosystem protection and restoration as criteria in project funding decisions for all DWR programs; plan for conservation, restoration and maintenance of the biological diversity and natural physical processes of aquatic and related terrestrial ecosystems; and plan and implement projects that contribute to the recovery of aquatic and riparian species listed under the federal and state Endangered Species Acts and other laws, as well as other at-risk species.In March 2012, the revised WREM 58b: Environmental Stewardship and Compliance was adopted. It provides guidance for consideration and application of Environmental Stewardship Principles along with project-level guidelines to improve DWR's ability to meet or exceed environmental compliance requirements. Following the adoption of WREM 58b, the Environmental Stewardship Implementation Plan Work Group (ESIP) has begun development of an Environmental Stewardship Implementation Plan. The Plan will focus on scoping and costs of developing education, outreach, and guidance on integrating Environmental Stewardship concepts and principles into all facets of DWR programs and projects. The ESIP Team has initiated the establishment of individual work teams to develop detailed scope and costs and products for each of five identified areas of need for implementing the ES Policy throughout DWR programs. The five areas include Resources, Technical Assistance, Monitoring, Education and Training, and Communication and Outreach plans. The outcomes of the project are expected to help advance environmental stewardship and sustainability objectives for public trust resources and the State's water management infrastructure by following the Director's Total Resource Management approach.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	November 2010	Project End Date:	DATE / IN PROGRESS / N/A X

External Partners:

N/A

Project Accomplishments for 2013:

WREM 58b was adopted on March 28, 2012. Planning for the implementation of the Environmental Stewardship Plan is ongoing through 2014.

Project Deliverables/Timeline:

The ESIP workgroup has formed and will begin development of an Environmental Stewardship Implementation Plan by 2014.

Customers:

DWR managers and staff

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Provide Assistance for Water Use Efficiency

Sponsor/Program Manager	Manucher Alemi
Project Managers	Kent Frame

Project Objective:

Implementation of Water Conservation Act of 2009 (SBX7-7) to achieve (1) urban water use reduction statewide by 20 percent per capita by the year 2020, and (2) to help agricultural water suppliers with efficient water management practices.

Project Description:

The Water Use and Efficiency Branch completed or made significant progress in nine projects in the year 2012 among the total 18 projects for implementation of SBX7-7. They include three projects in urban water use (U1, U2, and U6), four in agricultural water use efficiency (A1, A2, A6, and A7), and two projects in combined urban and agricultural water use efficiency (B1 and B2). All of those projects aim at water conservation and water use efficiency. U1 – Develop the best management practices in the CII water sector (CII - commercial, industrial and institutional); U2 – Update Demand Management Measures in urban water use and report to the Legislature; U6 – Reviewed the 2010 urban water management plans and reported to the Legislature in April 2012; A1 – In consultation with the AWMC, stakeholders and academics DWR completed a final report titled as *A Proposed Methodology for Quantifying the Efficiency of Agricultural Water Use* and submitted to the Legislature in May 2012. A2 – DWR adopted a regulation providing a range of options for water measurements that agricultural water suppliers may use to measure volume of water delivered to customers with sufficient accuracy to comply with the farm-gate delivery measurement requirement and to implement pricing structure. The regulation was approved by the OAL (Office of Administrative Law) in July 2012. A6 – DWR, in consultation with the SWRCB, revised the requirements for AWMPs and published the final document under the title of *A Guidebook to Assist Agricultural Water Suppliers to Prepare a 2012 Agricultural Water Management Plan* in November 2012 and posted it on the DWR website. In the Guidebook the impacts of the climate change on the agricultural water use were documented in detail, and DWR requires the agricultural water suppliers to include the climate change subject in preparation of their AWMPs. A7 – DWR developed grant/loan funding criteria to make agricultural water suppliers ineligible for state funding unless they comply with the Water Conservation Act 10608.56(b). These criteria were used in DWR 2012 Agricultural Water Use Efficiency PSP (Proposal Solicitation Package). B1 – WUE Branch has been developing a single standardized water use reporting form to meet the water use information needs. The form will be used by the urban water suppliers as well as by agricultural water suppliers for tracking their progress to reach the state water conservation targets. (ongoing) B3 – DWR will propose new statewide targets or revise and update existing statewide targets for regional water resources management practices including but not limited to recycled water, brackish groundwater desalination and infiltration and direct use of urban stormwater runoff. The updated targets will be included in the California Water Plan Update. (ongoing)

Funding Information:

Project Budget:	$10 million in multi-years	**Funding Source:**	Prop 84

Project Start Date:	U1 – Jan. 2010 U2 – Jan, 2010 U6 – Jan. 2010 A1 – Jan. 2010 A2 – Jan. 2010 A6 – Jan. 2010 A7 – Jan. 2010 B1 – Jan. 2010 B3 – Jan 2010	**Project End Date:**	U1 – early 2013 U2 – Project delayed U6 – Dec. 31, 2016 A1 – May 2012 A2 – July 2012 A6 – Nov. 2012 A7 – July1, 2013 B1 – 2013 B3 – Jan. 2011 (delayed)

External Partners:

U1: CUWCC (California Urban Water Conservation Council)
U2: an Independent Technical Panel consisting of retail water suppliers, environmental organizations, business community, wholesale water suppliers, and academia;
U6: None;
A1: AWMC, stakeholders, and academics;
A2:None;
A6: SWRCB
A7:None;
B1: California Bay Delta Authority, California Dept. of Public Health, CPUC, and SWRCB;
B3: None.

Project Accomplishments for 2013:

No Update Provided for 2013.

Project Deliverables/Timeline:

Project Deliverables/Timelines are included in the Project Accomplishments for 2012. (See the box immediately above)

Customers:

Urban water suppliers and agricultural water suppliers

GRANTMAKING & TECHNICAL ASSISTANCE

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Integrated Regional Water Management Grant Program

Sponsor/Program Manager	Tracie Billington
Project Managers	Joe Yun and Zaffar Eusuff

Project Objective:

For Proposition 84 IRWM funding

- Sustainable water management – developing estimates for water supply yield, water savings, improved water quality, etc.
- All IRWM Plans updated to 2012 standards
- More collaborative water management
- Improved integration of projects
- IRWM Plans consider Climate Change vulnerability adaptation
- Project selection considers mitigation of greenhouse gas emissions

Project Description:

The IRWM Grant Programs provide financial assistance in a manner that:

- Results in optimal investment of state funding providing maximum benefit to the State's people and environment through improved local and regional water management
- Is transparent and provides for engagement by partner agencies, interest-based stakeholders, and the public on program development and implementation
- Is consistent with legal, legislative, and DWR policy requirements for each funding source

Funding Information:

Project Budget:	Varies annually. Total authorized funding $1.25B	**Funding Source:**	Proposition 84 and 50 (IRWM)

Project Start Date:	November 2002	**Project End Date:**	December 2020

External Partners:

The IRWM grant program is solely administered by DWR. However, in order to deliver the program we work with a variety of state agencies along with 48 Regional Water Management Groups (RWMGs) supporting individual IRWM regions which includes a variety of local and regional water/flood management agencies, land use agencies, state and federal agencies, non-governmental organizations, and tribal entities.

Project Accomplishments for 2013:

- Released the Draft Plan Review Process, an addendum to the 2012 IRWM Program Guidelines
- Awarded approximately $4.7 million to 26 agencies for Local Groundwater Assistance grant program projects.
- Released Draft Funding Recommendations for the Proposition 84 Round 2 Implementation Grant Program.
  - 20 proposals were recommended for total grant funding of $131.1 million to support implementation of 139 projects. DWR received 34 proposals requesting a total of $241 million in funding.

Project Deliverables/Timeline:

Current program schedule: http://www.water.ca.gov/irwm/grants/docs/Index/Revised-Schedule_12_19_13.pdf

Customers:

48 RWMGs supporting individual IRWM regions which includes a variety of local and regional water/flood management agencies, land use agencies, state and federal agencies, non-governmental organizations, and tribal entities.

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Water-Energy Subgroup of the Governor's Climate Action Team ("WETCAT")

Sponsor/Program Manager	John Andrew
Project Manager	Qinqin Liu

Project Objective:

Coordinate state-level water-energy planning in support of AB 32

Project Description:

DWR is a principal agency in the Water-Energy Subgroup—known as the "WETCAT"—of the Governor's Climate Action Team. DWR coordinated Water-Energy policy and management actions with other principal WETCAT agencies including State Water Resources Control Board, California Energy Commission, and the California Public Utilities Commission. The WETCAT coordinates and focuses its efforts on GHG emission reduction actions related to the transport, treatment, delivery and use of water for environmental, agricultural, residential, commercial, institutional, and industrial needs. In 2008, the WETCAT developed following five measures in the AB 32 Scoping Plan.

- Water use efficiency
- Water recycling
- Energy intensity of water systems
- Urban runoff and stormwater reuse
- Renewable energy production

DWR has worked with other principal WETCAT agencies to develop AB 32 Scoping Plan update to address water and energy efficiency issues. DWR continues to play lead roles using integrated water management for water conservation, and water and energy use efficiency as well as water recycling.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2006	Project End Date:	DATE: X	IN PROGRESS	N/A

External Partners:

Other State agencies, State Water Resources Control Board, California Energy Commission, and the California Public Utilities Commission (CPUC)

Project Accomplishments for 2013:

DWR developed water-energy contents and coordinated with other WETCAT principal agencies to develop water-energy framework in CA Water Plan Update. DWR also continued to be a key player to develop water-energy funding and policy. As a key WETCAT agency and a research plan co-chair, DWR provided strategies, priority lists, review recommendations, and the contents to address water conservation, and water and energy use efficiency to develop AB 32 Scoping Plan update and CAT research plan

DWR continued to lead the implementation of the "20x2020" program to reduce per capita urban water use by 20% by year 2020. DWR also continued to lead the implementation of Water Use Reduction Guidelines for State Agency Facility Pursuant to Executive Order B-18-12.

Other DWR project accomplishments include: 1) managed programs for Agricultural Water Management Plans and Urban Water Management Plans, and provided evaluation and recommendations regarding climate change on Urban Water Management Plans, 3) provide assistance to obtain funding regarding water and energy efficiency projects in Urban Water Management and Integrated Regional Water Management.

Project Deliverables/Timeline:

DWR will complete Water-Energy sections of CA Water Plan Update, and related report and information framework by 2014.

Customers:

DWR, CEC, CPUC, SWRCB, CARB

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Climate Change in Urban Water Management Plans

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

To assess how water suppliers of different sizes and types have incorporated climate change into their 2010 Urban Water Management Plans, and to provide recommendations for how DWR could improve guidance for 2015 UWMPs to best support water suppliers in addressing climate change.

Project Description:

Urban Water Management Plans (UWMPs) are a crucial tool for ensuring adequate and reliable water supplies in California. These plans must be submitted by water supply agencies serving more than 3,000 customers or delivering over 3,000 acre-feet of water annually. Climate change is an increasingly important consideration in this water planning process. In its guidance for preparing 2010 UWMPs, DWR encouraged, but did not require, water suppliers to consider climate change impacts and GHG emissions. This study assesses how suppliers of different sizes and types have incorporated climate change into their 2010 plans. It also provides recommendations for how DWR could improve guidance for 2015 UWMPs to best support water suppliers in addressing climate change. The results of this study will help DWR better assess local responses to climate change risks, and to provide improved guidance and support to water suppliers.

Funding Information:

Project Budget:	$11,000	**Funding Source:**	Prop 84

Project Start Date:	August 28, 2012	**Project End Date:**	June 30, 2013

External Partners:

UC Berkeley

Project Accomplishments for 2013:

This study was conducted by Esther Conrad, PhD candidate at UC Berkeley, in collaboration with the Climate Change Program. DWR provided population data from approximately 200 UWMPs that had been entered into the DWR Online Submittal Tool (DOST). Of these, approximately 60 UWMPs were selected for inclusion in the study, representing water suppliers of various sizes and types. These UWMPs were analyzed for their content on climate change. In addition, 10 representatives of water suppliers were contacted by phone to understand their perspectives on climate change in the context of urban water management planning. A draft report was completed in December 2012 and was circulated within DWR and to external reviewers. Revisions were made based on these comments, and a second draft was circulated to water suppliers whose UWMPs were included in the study. After incorporating

feedback from water suppliers, the final version of the report was completed and posted on the DWR Climate Change website in June 2013.

Project Deliverables/Timeline:

The final report, entitled "Preparing for New Risks: Addressing Climate Change in California's Urban Water Management Plans," was submitted in June 2013, and is now publicly available at: http://www.water.ca.gov/climatechange/docs/UWMPClimateChangeReport_Final_June2013.pdf

Customers:

DWR's Climate Change and Water Use Efficiency Programs, urban water suppliers submitting UWMPs

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Regional Governance of Flood Management in the Central Valley

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

This project will analyze the current status of Integrated Regional Water Management (IRWM) planning and Regional Flood Management Planning (RFMP) in the Central Valley with respect to flood management, including consideration of how climate change may impact flood risks, and identify opportunities for coordination between the IRWM and RFMP processes to advance the CVFPP. The project will require review of planning documents and conversations with DWR staff, IRWM regions, and RFMP groups. A report will be prepared summarizing project findings.

Project Description:

Six Regional Flood Management Planning (RFMP) groups have been established in order to refine and implement the Central Valley Flood Protection Plan (CVFPP). These overlap with Integrated Regional Water Management (IRWM) regions located in the Sacramento and San Joaquin river systems, whose scope includes flood management. There is a need to analyze the current status of IRWM regional planning in the Central Valley with respect to their governance structures, flood management efforts, and climate change analyses, and to identify the opportunities presented by coordination between the IRWM and RFMP processes. This can help DWR develop future guidance and support for regional governance to effectively implement the CVFPP. The project will support DWR's planning for flood management by assembling and analyzing information about regional flood planning in the context of IRWM regions and RFMP groups in the Central Valley. It will also gather information from both planning processes about how climate change risks are being considered in the context of flood planning, and identify opportunities for greater knowledge sharing and coordination on this topic.

Funding Information:

Project Budget:	$11,000	**Funding Source:**	Prop 84

Project Start Date:	September, 2013	**Project End Date:**	August, 2014

External Partners:

UC Berkeley

Project Accomplishments for 2013:

This study analyzes the origins and functioning of the Integrated Regional Water Management and Regional Flood Management Planning processes, and the degree of coordination between them to address flood risks in the Central Valley. It examines how these two processes are working to generate multi-benefit strategies and account for climate change, and discusses opportunities for future coordination. This report was written by Esther Conrad, PhD candidate in Environmental Science, Policy and Management at the University of California at Berkeley.

Project Deliverables/Timeline:

The final report, entitled "Regional Governance of Flood Management in the Central Valley: An anlysis of the Integrated Regional Water Management and Regional Flood Management Planning processes," was submitted in May 2013, and is now publicly available at:
http://water.ca.gov/climatechange/docs/IRWM_RFMP_FinalReport_May2014.pdf

Customers:

DWR's Flood Management Division, Regional Flood Management Planning groups, IRWM regions in Central Valley

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Provide Technical Assistance and Outreach for Integrated Regional Water Management (IRWM) Plans, Data Collection, and Other Climate-Related Tasks

Sponsor/Program Manager	John Andrew
Project Manager	Elissa Lynn

Project Objective:

To provide resources, technical assistance, and outreach within DWR and to IRWM planning groups, water agencies, and local governments to incorporate climate change mitigation and adaptation into their planning efforts

Project Description:

After the passage of Proposition 84, Water Code Section 10541was updated to define the elements of guidelines developed for approving and distributing the funds. These elements included requiring IRWM plans to consider greenhouse gas (GHG) emissions of identified programs and projects and to evaluate the adaptability to climate change of water management systems in the region. As a result, DWR 2010 and 2012 guidelines for these funds required IRWM Plans to address both adaptation to the effects of climate change and mitigation of GHG emissions. This project involves developing and identifying climate change resources, working on data collection and consolidation, and providing technical assistance and outreach within DWR and to IRWM planning groups, water agencies, and local governments to mitigate for and adapt to climate change.

Funding Information:

Project Budget:	$400,000/year	**Funding Source:**	Prop 84

Project Start Date:	January, 2010	**Project End Date:**	In progress

External Partners:

N/A

Project Accomplishments for 2013:

Assistance included distributing information at numerous local IRWM stakeholder meetings throughout the year and at two DWR workshops on *Climate Change, Extreme Weather, and Floods* for Southern California in January and for the Central Valley in February, and presenting the *Climate Change Handbook for Regional Water Planning* and climate change resources at the Regional Fora held statewide in January, April, May, September, October, and December. Staff presentations on climate change resources, mitigation and adaptation, and the climate change handbook occurred at the *Santa Ana Climate Change Workshop* in February, the *Southern California Groundwater and Climate Change Workshop* in February sponsored by the Water Policy and Science Center and the Center for Conservation Biology at the University of California in Riverside, the *Central and Southern California: IRWMP Planning and Climate Change* workshop in March, the Governor's Office of Planning and Research's *Confronting Climate Change: A Focus on Local Government Impacts, Actions and Resources* in April, the *Sierra Water Workgroup Summit* in June, and the Council for Watershed Health's *The Mediterranean City 2012: A Conference on*

Climate Change Adaptation also in June. Staff continued to participate in the Government Alliance Pillar of the Santa Ana Watershed Project Authority (SAWPA) in the update of its IRWM plan, *One Water One Watershed* (OWOW), and the development of a government resource booklet, as well as to provide the pillar with presenters from DWR headquarters involved with the Regional Advance Mitigation Planning process and the Riparian Habitat Joint Venture.

The Regional Water Management Groups are initiating climate change work for the updates of their IRWM plans. Regional staff participated in the San Diego IRWM and the Antelope Valley IRWM climate change workgroups, the San Diego IRWM Land Use Planning and Watershed workshops, and the Greater Monterey IRWM, Upper Pit River IRWM, Bay Area IRWM, and the Consumnes, American, Bear, and Yuba (CABY) IRWM Technical Advisory Committees for climate change.

Staff experts from headquarters and the regional offices continued to update DWR's climate change website (http://www.water.ca.gov/climatechange/) with new resources and publications, continued dissemination of the Climate News Digest (http://www.water.ca.gov/climatechange/news.cfm), and finalized a summary report on the collection of climate data by volunteers. The Climate News Digest posted its Two-Year Anniversary Issue in April, while the climate blog, *Current Perspectives*, was put on hiatus because of the difficulty in getting articles from interested parties.

Staff worked with the State Climatologist, Dr. Michael Anderson, on analyzing statewide precipitation data and began cataloging the large amounts of climate data stored in the regional offices. Staff coordinated with retired State Climatologist, Jim Goodridge, to apply quality assurance and quality control standards on statewide precipitation data, to integrate those data into Geographic Information Systems, and to develop mapping for multiple products. Staff is also involved with a station update and verification process of Bulletin 195 in order to facilitate the process of collecting, storing, and analyzing precipitation data from various sources throughout California. This process is focused on Jim Goodridge's critical and unique knowledge of precipitation Depth-Duration-Frequency curves and annual extremes data sets that make up Bulletin 195. These datasets are stored on over 4,000 spreadsheets containing thousands of precipitation stations. Regional staff are learning the complexities of the datasets and facilitating the sharing process among data providers, DWR, the Western Regional Climate Center, GEI Consultants, Inc., and others. Data from verified stations will feed into databases, in coordination with Dr. Anderson's efforts for emergency response and planning initiatives and for monitoring climate change, and will provide relevant climate information and value added products for the general public. Extreme precipitation analysis will ultimately be available from map-based servers from DWR's Flood Emergency Response Information Service.

Project Deliverables/Timeline:

2013:

- San Diego IRWM Climate Change Planning Study
- San Diego IRWM Land Use and Water Management Study
- Antelope Valley IRWM Climate Change Planning Study
- Greater Los Angeles County IRWM Climate Change Planning Study
- Upper Santa Margarita River Watershed IRWM Climate Change Planning Study
- SAWPA's OWOW 2.0 Resource Guide
- Upper Pit River IRWM Vulnerability Assessment to Climate Change
- Greater Monterey IRWM Vulnerability Assessment for Climate Change
- Bay Area IRWM Vulnerability Assessment for Climate Change
- CABY IRWM Vulnerability Assessment for Climate Change

Customers:

DWR, IRWM planning groups, water agencies, and local governments

CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Federal Grant Programs

Sponsor/Program Manager	Executive
Project Manager	Jeanine Jones

Project Objective:

Seek federal funding where applicable for climate-related activities, particularly research activities

Project Description:

Grant or Other Applications for Federal Funding

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:	2008	**Project End Date:**	DATE IN PROGRESS N/A X

External Partners:

Ocean Science Trust, Scripps Institution of Oceanography, USACE

Project Accomplishments for 2013:

No Update Provided for 2013.

Project Deliverables/Timeline:

Funding decisions for the NOAA grant program would typically be made in spring 2013, but present uncertainties in the federal budget situation make it difficult to speculate when funding decisions might be announced. USACE has provided its cost-share for the follow-up NRC workshop to NRC; the workshop will be held in mid-2013.

Customers:

DFM, DWR programs interested in SLR

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

National Scientific and External Coordination Committees

Sponsor/Program Manager	Executive
Project Manager	Jeanine Jones

Project Objective:

Represent DWR at interstate, national, and international levels on climate-related matters

Project Description:

During 2012, DWR staff again engaged with interstate and national climate change efforts. Jeanine Jones served on NOAA's Climate Working Group, a subcommittee of NOAA's Science Advisory Board, and on USEPA's State and Tribal Council, a federal climate change advisory committee. She also represented the Western States Water Council (WSWC) on a technical advisory committee to the federal Climate Change and Water Working Group (a coalition of multiple federal agencies including USBR, USACE, NOAA, and USGS). She chaired the WSWC Climate Subcommittee and served on an American Meteorology Society committee on water resources applications.

Funding Information:

Project Budget:	N/A	**Funding Source:**	N/A

Project Start Date:		**Project End Date:**	DATE / IN PROGRESS / N/A: X

External Partners:

NOAA, USBR, USACE, USGS, NOAA RISAs

Project Accomplishments for 2013:

No Update Provided for 2013.

Project Deliverables/Timeline:

Continue to influence federal agency decisions regarding climate change programs, with a near-term focus on extreme events. In 2013, hold workshop on drought prediction with WSWC, and seek federal funding support for a climate analog years data project. Continue working with WSWC and WGA on congressional reauthorization of the National Integrated Drought Information System legislation, and on funding support for the NOAA Hydrometeorology Testbed program.

Customers:

Other public agencies

PUBLIC OUTREACH

CLIMATE CHANGE PROGRAM PROJECT SUMMARY AND STATUS

Project Name:

Public Outreach on Climate Change

Sponsor/Program Manager	John Andrew, Elissa Lynn
Project Manager	Michelle Selmon

Project Objective:

DWR is actively engaged in outreach efforts internal to the Department, as well as with multiple partners on the water resources impacts of climate change. The focus is on public awareness, partnerships, adaptation and mitigation strategies. DWR also maintains a climate change website which provides the opportunity for the general public to e-mail climate change inquires to DWR staff.

Project Description:

Public Outreach – Exhibits

Staff continues to search for opportunities to establish exhibits on climate change as have been opened at the Aquarium of the Pacific in Long Beach and the Fairmead Fossil Discovery Center.

Public meetings

DWR staff made numerous public presentations on climate change in 2012 (a list is provided in the Accomplishments section), and attended many public meetings on behalf of the climate change program.

Workshops

International Workshop for Aquatic Research and Environmental Management, May30, Nanjing, China
"Climate Signals", Water Year Outlook Workshop, November 21-22, Scripps

Reports/Articles

The Climate News Digest is a compilation of articles, reports, blogs, legislative updates, and other resources related to climate change that is intended to keep DWR staff members up to speed on a variety of current climate change-related issues. Current and archived Climate News Digests are available to the public approximately every three weeks at http://dwrclimatechange.water.ca.gov/digest.html. The Climate News Digest has been produced since April 2010.

Project Accomplishments for 2013:

The Fairmead Fossil Discovery Center (FDC) exhibit opened in June after nearly 2 years of work with the FDC on text for the exhibit and maneuvering through administrative hurdles.

DWR Climate Literacy Training Classes were held in the Sacramento Training Center on May 21 (101) and 22 (201) and in the South-Central Regional Office on August 27 (101), August 28 (101), and 29 (201).

Attendance averaged 25 persons per class; providing training to numerous DWR employees on the impacts of climate change to the water sector.

Climate Literacy Class 101, held annually, is designed to inform DWR staff about the climate and climate change issues that relate to water management in California. Introductory level presentations are given on the weather and climate of California; hydrologic change measurement and analysis; Greenhouse gas emissions, Internet resources and literature; impacts to California water management; DWR's climate change responses, strategies and activities; state and federal regulations; and research and science updates. A group activity brings together individual experience and course training, to put climate change into context for the various regions of the State. In addition to learning background information, participants engage in discussions about climate change and receive resources that facilitate both their work and their ability to impart reliable information to society at large.

Climate Literacy Class 201 is designed for the DWR staff member who understands the climate and climate changes issues facing the State, and the Department's role in adapting water management strategies and mitigating for CO_2. This course provides advanced presentations on the topics of stewardship and land use as relate to climate change, sustainability, CEQA, the Department's Climate Action Plan, climate change resources for project managers as well as those available to the public, modeling approaches and assumptions, and activities within and outside of DWR related to climate data and tools. In addition, participants receive Internet and agency resources to help them keep up with rapidly advancing science, and state and federal mitigation and adaptation efforts. A group activity helps them put course materials and their experience together to craft management-level decision-making related to climate change in California. It is the goal of the 201 course to provide DWR staff practical support and context for their work, as well as training to be able to impart reliable information on the topic to society at large.

The DWR Outreach and Education (O/E) Team was formed in April with a goal of producing educational and outreach materials about climate change for DWR staff, water managers and the public. The O/E Team meets monthly to discuss lessons learned during presentations and other outreach opportunities and progress made by the fourteen outreach and education subgroups that are part of the O/E Team.

Presentations on Climate Change by DWR Staff in 2013:

Michael Anderson
"Climate Change and Agriculture", CDFA Workshop, January 22-23, Seaside.
Mountain Counties Water Agencies Climate Change Adaptation Panel, March 15, Auburn
UC Office of the President Climate Change Panel, April 10, Ontario
"Tracking Change - Existing and New Monitoring Systems to Document Climate Change" California Water and Environmental Modeling Forum, April 22, Folsom
ASCE/EWRI Climate Change Symposium, May 20-22, Cincinnati, OH,
"Climate Change and Hydrology", Auburn Dam Council Meeting, June 7, Sacramento
"California Climate Conditions", CCSS Annual Meeting, Nov 6-8, Mt. Shasta City
"Climate Signals", Water Year Outlook Workshop, November 21-22, Scripps

John Andrew
American Society of Civil Engineers/Environmental Water Resources Institute, March 7, Sacramento
UC Davis, Climate Change, Water, and Society, April 8, Sacramento
"Scales of Water Management in Mediterranean-Climate Basins," Institute of International Studies, April 19, Berkeley (moderator)
Prayer Breakfast, California Interfaith Power and Light, April 24, Sacramento

"Getting Water Smart," American Rivers/Natural Resources Defense Council, May 14, webinar
"Sacred the Water," St Francis of Assisi, June 12, Sacramento
Beahrs Environmental Leadership Program, July 17, UC Berkeley
Climate Change Law and Policy, King Hall, September 16, UC Davis

Erin Chappell
"Climate Change at the Department of Water Resources", delegation from Morocco, March, Sacramento.
"Climate Change Impacts: Bay-Delta Region", Water Education Foundation Bay-Delta Tour, June, Sausalito
"Climate Change and SF Bay Area Water Supplies: IRWM Solutions for Addressing Diverse Impacts" Poster Presentation, State of the Estuary Conference, October, Oakland

Pete Coombe

"Cross Boundary Collaboration (XBC)" DWR brownbag. April 3, Red Bluff.
"Crowdsourcing Water Resources Data and CoCoRaHS" California State University California, Geoscience Department. May 9, Chico.
"California Water Plan Regional Report Update, Climate Change Adaptation" CWP Plenary Session. October 29, Sacramento.

Jeanine Jones
"Statewide Water Conditions and Preparing for a Dry 2014", December, Fresno
"Statewide Water Conditions and Preparing for a Dry 2014", October, Irvine
"Measuring, Quantifying, and Reporting Drought Impacts - Workshop Purpose and Goals", August, San Diego

Qinqin Liu
California Water Plan Plenary, October 29, Sacramento

Jennifer Morales
California Water Plan Plenary, October 29, Sacramento
"Water Resources and Native Americans", Riverview Elementary, November, Fresno
"DWR Climate Change Program Achievements, Plans and Initiatives", February 20, Davis

Lauma M. Jurkevics
"Climate Change Resources at the Department of Water Resources," Southern California Water Dialogue, March, Los Angeles.
Poster Presentation: "Climate Change: Stressing Our Water Systems," Santa Ana River Watershed 2013: The Power of Partnerships, April, Costa Mesa.
Poster Presentation: "California's Changing Water," Santa Ana River Watershed 2013: The Power of Partnerships, April. Costa Mesa.
Poster Presentation: "Climate Change at the Department of Water Resources," Santa Ana River Watershed 2013: The Power of Partnerships, April, Costa Mesa.
"Climate Change Resources at the Department of Water Resources," Central Municipal Water District Caucus, May, Commerce.
"Climate Change Resources at the Department of Water Resources," Fire Summit, May, Diamond Bar.
Poster Presentation; "Climate Change: Stressing Our Water Systems," Fire Summit, May, Diamond Bar.
Poster Presentation: "California's Changing Water," Fire Summit, May, Diamond Bar.
Poster Presentation: "Climate Change at the Department of Water Resources," Fire Summit, May, Diamond Bar.
"Climate Change Resources at the Department of Water Resources," Sierra Club – Angeles Chapter, Water Committee, July, Los Angeles.
Poster Presentation with Michelle Selmon, Erin Chappell, Peter Coombe, and Andrew Schwarz;"The Past, Present, and Future of the DWR Climate Program," DWR 2013 Environmental Scientist Workshop, September, Loomis.

Maury Roos
"Climate Change and the Future of the California Delta", November, Amsterdam

Andrew Schwarz
"Development and Implementation of Greenhouse Gas Emissions Reduction Plans", California Utility Water Alliance-Climate Change Work Group Meeting, May 1, Sacramento.
"Climate Change Adaptation Planning and Successes", Getting Climate Smart: Water Resources Preparedness Planning for State Government. May 15, Sacramento.
"Climate Change Impacts on Water Resources: Where are we going and why are we in this hand basket?". Groundwater Association Annual Conference. October 9, Sacramento.

Michelle Selmon
"Climate Change Adaptation Strategies in Water Management", Southern Sierra Adaptation Workshop, February, Visalia
Presentation for Sunnyside High School AVID Program, February, Fresno
Presentation to the San Luis Field Division on the GGERP, March, Los Banos
"Climate Change Adaptation", UC Davis Extension, March, Sacramento
"Climate Change and Water Management in California", AEP Conference, April, Long Beach
"Climate Change Adaptation Across the Landscape", Sierra Water Working Group, June, Lake Tahoe
"What's New on the Climate Change Front?", Environmental Scientist Conference, September, Sacramento
Presentation to Mountain View Elementary 6th Grade, November, Fresno

Funding Information:

Project Budget:	$100,000	**Funding Source:**	Prop 84

Project Start Date:	2007	**Project End Date:**	DATE	IN PROGRESS / N/A
				X

External Partners:
Aquarium of the Pacific, Buena Vista Natural History Museum, Fossil Discovery Center, DWR Training Office

Customers:
Public, DWR

Office of the California State Climatologist

Dr. Michael Anderson-

Over the past year the California State Climate Office has been involved in a variety of projects and collaborations that apply to this technical coordinating committee. The efforts are in the areas of design hydrology, volunteer observing networks, extreme precipitation monitoring, and weather normalization of water use.

A new project was launched in 2008 to begin the deployment of weather monitoring equipment to assist in the forecasting and monitoring of extreme precipitation conditions in California. The project is a partnership effort between DWR, Scripps Institute of Oceanography, and NOAA's Earth Systems Research Laboratory (ESRL). Three types of instrumentation are to be deployed in this project: GPS-Met (water vapor), soil moisture, and vertically pointing radar (freezing level). Deployment of the instruments has occurred over the past five years. Data from the new instruments will also be disseminated via DWR's California Data Exchange Center operational database as well as via Meteorological Assimilation Data Ingest System (MADIS). An additional 5-year agreement is in progress to further evaluate the network and develop decision support tools with the new data streams.

Calendar year 2013 is on pace to be the driest for many parts of the state. A strong monsoon provided above average conditions to the desert southeast part of the state.

In its fifth year of operation, the CoCoRaHS California effort has signed up more than 1000 volunteers with over 10,000 precipitation reports entered each month. It provides an opportunity for the State Climatologist to interact with the multiple weather forecast offices that serve the state and also serve as regional coordination points for the program.

The Department of Water Resources has historically maintained a volunteer climate observing network since the 1960s. At one point the network had over 400 volunteers who reported daily temperature and precipitation to the regional offices in monthly reports. The network has been in decline recently and the Department is evaluating discontinuing the network due to budget and staff limitations. A committee was formed to evaluate the current condition of the network and evaluate different options for migrating the observers to other networks including CoCoRaHS. A decision was made this year to migrate the remaining 80+ observers to CoCoRaHS in the coming year.

As part of the development of the 2012 Central Valley Flood Management Plan, a group of scientists and engineers were gathered to discuss the approach to be used to incorporate climate change. A first group of 20 worked collectively with the assistance of a meeting facilitator to determine the scope of the effort to incorporate climate change into the plan. A second smaller work group focused on developing a methodology recognizing that traditional impacts analyses are not functional for flood analyses at this time. Instead, a threshold analysis methodology was developed starting with the known thresholds of the flood management system and working back towards climate signals, weather systems, and runoff patterns that could exceed those thresholds. The report was made an attachment to the Central Valley Flood Protection Plan released in December 2011. Further work on incorporating climate change of atmospheric rivers into flood planning design floods is in progress.

In general, dissemination of climate information from the office occurs via web page, phone, fax, email and print. In collaboration with Western Region Climate Center is underway to expand the capabilities of the State Climate Office to process and depict data from multiple networks such as the California Data Exchange Center and the California Irrigation Management Information Service. The tools are part of the SC-ACIS program at the Regional Climate Centers.

Climate Change Matrix Team

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Jamie Anderson

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Ajay Goyal

Kamyar Guivetchi

Michael Healey

Veronica Hicks

Ray Hoagland

Maria Hollister

Jeanine Jones

Rich Juricich

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Kathy Kelly

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